

Contractors and Engineers Monthly

Vol. 31, No. 6

DECEMBER, 1935

\$1 a Year, 20 Cents a Copy

PICKS and SHOVELS

By O. E. POTTER

England Too Has Its Road Show

In November there was held in the Royal Agricultural Hall in London a Public Works, Roads and Transport Congress and Exhibition which proved to be a great success. Similar to our A. R. B. A. Convention and Road Show, the Congress and Exhibit included an interesting program of papers and discussions as well as giving those attending an opportunity to observe the latest developments in road building equipment and materials.

As F. Wilkinson, President of the Institution of Municipal and County Engineers puts it, in true British fashion, in *Roads and Road Construction*, "The combination of Congress and exhibition is exceptionally useful, since the latter often provides practical illustrations of matters discussed in the conference hall, while discussions are stimulated by ideas derived from a tour of the stands."

The 1935 Roads Congress and Exhibition in England is reported as successful as any ever held. Let's make our A.R.B.A. Road Show even more so!

Orders Is Orders

Quarry Superintendent Steves and Powderman Wilson for the production of stone for the Los Angeles breakwater had orders to furnish stone in big chunks. Taking them at their word, they established a quarry record by producing one boulder weighing 5,000 tons, according to a story in the *Explosives Engineer*. Attacking this monster, the block-holders reduced this to several boulders of from 20 to 30 tons. Soon after this blast was set off,

(Continued on page 23)

In This Issue

Bituminous Roads.....	8
Bridge Construction.....	2, 6
Bulletins and Pamphlets.....	26
Canal Construction.....	18
Cartoon.....	4
Concrete Roads.....	2
County Roads.....	13
Drainage Control.....	15
Editorials.....	4
How the Other Fellow Did It.....	24
Lubrication.....	10
Muskingum Conservancy Project.....	1
Repaving.....	1
Road Shows.....	6, 18
Roads of the World.....	5
Safety in Construction.....	4
Sewer Construction.....	19
Snow Removal.....	11, 13
Water Works Construction.....	22
Welding.....	6
Winter Work.....	4

Dams of Muskingum Project

Tractors and Dump Wagons Build Charles Mill Dam

(Photos on page 32)



Almost Ready to Remove the Rails

Chiseling Helps on Repaving Job

Parker-Schram Co. Devised Simple But Effective Way to Remove Tracks and Ties in Portland, Ore.

By HENRY W. YOUNG

AN interesting problem of track removal was encountered by the Parker-Schram Co. of Portland, Ore., in its contract covering 12 blocks, 0.59 mile, of paving in the downtown section of that city, known as the Ash St.-Jefferson St. Unit of the Fourth Avenue Section of the Pacific Highway in Portland. What had once been the tracks of the Southern Pacific Railroad were buried beneath the street surface, the ties being embedded in concrete, the latter to remain, however, for the foundation of the new pavement.

The removal of a 4-inch wood block pavement and a 1-inch cement grout cushion on the sides of the street, taken up by means of forks and a skimmer-rigged Type 207 P & H diesel, exposed the concrete foundation and a narrow dummy strip of Belgian blocks on each side of the rail. When the blocks were removed by pavement breakers and skimmer the rails were left in the clear on one side. They were then lifted by the skimmer rig and laid by the curb, to be taken away by truck later.

Excavating for Ties

Next, the surface between rails and between tracks was broken and skimmed off to the level of the ties. The latter, embedded as they were in 6 to 8 inches of concrete, ends as well as sides, seemed to call for a time-eating job of removal. It was accomplished, however, without excessive loss of time by chiseling out one end of each tie for a distance of 10 to 12 inches. This permitted of a flat bladed hook being driven under the end of the tie with a couple of blows of a sledge. The hook, attached to a heavy chain, was suspended from the teeth

(Continued on page 23)

CHARLES MILL DAM, of the chain of flood control and conservancy dams now under construction in the Muskingum Conservancy District, is located near Mansfield and Ashland, Ohio, on the Black Fork, tributary of the Mohican River. The Charles Mill Project consists of an earth dam 1,390 feet in length and 50 feet high and two dikes totaling 1,840 feet in length. The dam is on a rock and pervious foundation with a concrete overflow spillway. Five short conduits each with 3½ x 7-foot gates will control the flow of water from the reservoir. The drainage area above the dam is 216 square miles and the dam will impound 7,400 acre-feet of conservancy storage and provide 80,600 acre-feet of flood storage.

The contract for the construction of this dam and dikes was awarded to Ryan & Myers of Campbellsburg, Ind., on November 24, 1934, for \$313,894.80. The work includes 187,000 cubic yards of common excavation, and 17,000 cubic yards of rock excavation. There will be 247,000 cubic yards of material in the dam and dike embankments and 15,810 cubic yards of concrete in the spillway or overflow structure. The embankment is spread in 6-inch layers loose and compacted with sheepfoot rollers. The downstream slope of the face is 1 on 2½ to 1 on 3 and the upstream face the same.

Rock Excavation for Spillway

A high side hill cut of 25 feet was required for the auxiliary spillway. This was benched and consisted of work in shale at the top, then about 15 feet of sandstone and at the bottom a very hard gray sandstone. The contractor used Cleveland wagon drills with the top

Contractor's Methods Described in Second Article of Series on Flood Control Works

hoist for handling the maximum 20-foot steel. Additional drilling was done with six I-R jack hammers and compressed air was provided by an I-R 330-foot machine and a 6-cylinder air-cooled unit. The drilling was all done with 1½-inch Timken detachable bits. Du Pont 40 per cent gelatin was used for shooting the rock with excellent results. The rock was loaded out by one or both of the power shovels which were later used for handling all the embankment material, a Lorain 75 and a Lorain 77, both 1½-yard machines.

Embankment

At the time this contract was visited to secure the material for this article the Lorain 77 diesel 1½-yard shovel was loading earth from a borrow pit at the top of a long hill to four Euclid 8-yard Trac-Truks and a pair of Euclid 8-yard crawler wagons. The average haul was about 1,500 feet. The Trac-Truks ran at a maximum speed of 13 miles per hour on the level stretch, returning empty to the shovel. They were equipped with Euclid tire tracks on the rear wheels of the tractor unit. These tracks consist of 20½-jointed sections or shoes per track for the 13.50 x 24 tires used. The embankment was spread by two Caterpillar diesel Fifties with Euclid bulldozers, and rolled with two Euclid sheepfoot rollers pulled by a pair of Caterpillar Sixties.

The toe trench for the embankment was cut with a P & H dragline. This trench was lined with a filter of sand

(Continued on page 21)

BITUMINOUS CONSTRUCTION IN SOUTHWESTERN OHIO



C. & E. M. Photo

Waterbinding a 5-Inch Base Course for a Penetration Macadam Top. See Page 8.

New Entrance Highway for Kansas City, Mo.

(Photos on page 32)

A 1.791-mile NRH project, 61-I, from the eastern city limits of Kansas City, Mo., eastward on U.S. 24, will provide another attractive entrance to the city paralleling U.S. 40. The new project awarded to McGlone Paving Co. of Kansas City, Mo., includes 42-foot pavement, widening of old paving with 18-inch strips and parkway areas for 3,400 feet near the intersection of Winner Road. Those who have driven into Kansas City on U.S. 40 realize that the State Highway Department set itself a task to provide an even more attractive traffic artery on U.S. 24, with the elimination of as many grade crossings as possible. Other contracts on this same highway have taken out bad crossings of railroad yards and main line tracks.

Some of the Handicaps

It was necessary to keep the old road open to traffic at all times, which made progress slow when pouring the 18-inch widening strips. Furthermore all the cross streets had to be provided with facilities for egress throughout the work.

An old overpass at Blue Ridge had to be altered considerably, because of the change in grade and alignment of the new roadway. Three spans of the overpass were ripped out and all the hand-rail was removed. The spans were replaced with a single 70-foot plate girder. The hand-rail had to be removed to care for realignment of the grade and the curb was bush hammered and a new shell curb constructed for the same reason.

The Widening Strips

The 18-inch widening strips were 9 inches thick and carried a lip curb 9 inches wide and 3 inches high on all grades and super-elevated curves. The widening strip was doweled to the old slab by 1/2-inch hook bars set into the old slab every 5 feet. The slab was drilled by a jack hammer and the bar set in and held firmly by a collar of lead driven tight by a circular wedge-shaped follower. The bar carried a hook to hold a continuous 3/4-inch reinforcing bar 6 inches from the old slab and at mid height.

Heltzel steel forms and lip curb forms were used for the widening strips and also for the full width paving. On the full-width paving the expansion joints were set every 100 feet and a contraction joint formed by the insertion of a piece of sheet metal every 50 feet alternating with the expansion joints which were trans-load air core joints. On the widening strips the expansion joints were set to match the joints in the old pavement.

Batching and Mixing

With the widening strips strung out along a roadway that had to be kept open for traffic, it was decided that it would not be expedient to run the paver on the road. The batching plant was located about a mile from the paver when running widening strip. A Johnson batching plant was served by an Industrial-Brownhoist crane with a Blaw-Knox 1-yard clamshell bucket, and was located at the side of the road on an elevation where all aggregates had to be hauled in by truck. The dry batches averaged 1,990 pounds of stone, 1,520 pounds of sand and 6 sacks of cement to the batch. On full-width paving bulk cement was used.

Two dry-batch trucks hauled the weighed batches from the plant to the Koehring 27E paver which was parked in a boulevard strip at about the center of the widening operations. When pouring the full-width pavement, from 15 to

NRH Project on U.S. 24 Provides 42-Foot Road with New Pavement and Widening with Parkways

20 batch trucks were in service. Also a second paver was used for pouring the top 2 inches of the slab over the reinforcing mats. The new Koehring poured the bottom 8 inches for the 20-foot width which was poured at a time for the 42-foot pavement.

A single wet batch truck was all that could be accommodated on the pavement and with the number of men that could be conveniently used for the narrow pour. The concrete was mixed 67 seconds in the drum to fulfill the specified 60-second mix after the skip is empty. Three men shoveled the concrete from the piles on the slab where it was dumped by the wet batch truck, into the graded section between the forms and the old slab. One man set the lip curb



C. & E. M. Photo

Frank Creason

form, another built the curb and a third finished it. All concrete in the widened section was hand tamped in place of the usual machine finishing used on the wide slabs.

Making Traffic Lines

The specifications on this contract called for a white traffic line along the center line of each 20-foot slab. This marker is composed of Medusa white cement and white aggregate, in a 1:2:3 mix, and is 8 inches in width. Built into the slab immediately and directly

behind the finishing machine, this work has heretofore been rather a difficult job as it is necessary to obtain a straight line with neat edges without the white concrete and the gray mixing.

For use on this project Frank Creason invented a metal device 12 feet in length which serves as a form for the white concrete. With this device, the work was done by one man and a helper where heretofore from five to ten men have been required and they did not always do a neat job.

Personnel

The McGlone Paving Co., contractor for this project, is made up of Perry McGlone, Mrs. Perry McGlone and Frank Creason, the inventor of the Lakewood mechanical form tamper, who personally directed the work. Proctor Pierce was Superintendent for the contractor and G. D. West was Project Engineer for the State Highway Department.

This gave a mix more nearly approaching 1:1.75:4.25 and produced concrete with an average actual strength of 5,890 pounds. The specifications were such that the contractor could not save on cement to give the specified strength and therefore produced a concrete far in excess of the strength required.

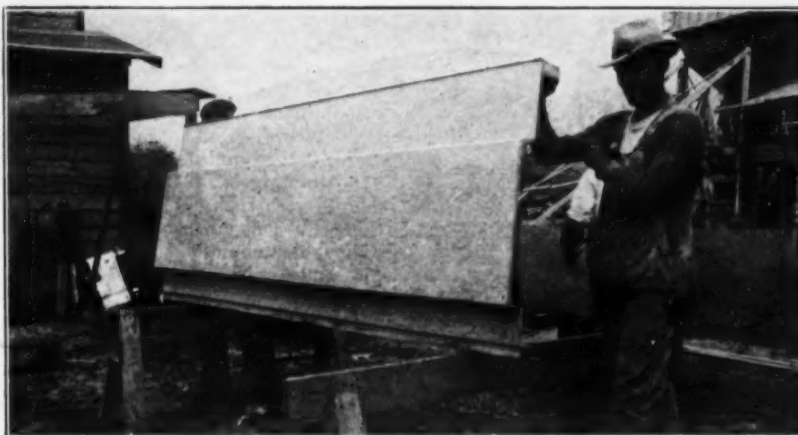
Assembling the Batches

The aggregates were produced by a local company at the site. The sand and gravel were excavated from the bed of the Guadalupe River with a small dragline, loaded into trucks and hauled about 1/4 mile to the crushing, washing and screening plant adjacent to the contractor's concrete mixing plant. The aggregates were stockpiled in three sizes; sand, 1 1/2-inch gravel and 3/4-inch gravel for hand-rail.

The stockpiles of sand and 1 1/2-inch gravel were made over a 100-foot tunnel, 4 x 5 feet in cross-section with openings every 10 feet for feeding the materials to a belt conveyor. The inspection forces felt some apprehension lest the material in the stockpile become segregated in continuously running through the central cone onto the conveyor. A careful study of the path of the material showed, however, that the coning virtually quartered the material, as in sampling, and a large number of analyses of the sand and gravel showed perfect uniformity.

The cement house, measuring about 15 x 40 feet, was at right angles to the aggregate conveyor and had a capacity for storing fully 2,000 bags of cement if required. Delivery was so uniform that it was not necessary to store large quantities of cement and most of it was handled direct from the delivery trucks across the narrow dimension of the house, onto special wooden pallets which held 6 sacks of cement each, rolled on a Mathews roller conveyor

(Continued on page 17)



C. & E. M. Photo

Plywood Form for Hand-Rail

Compact Concrete Plant Speeds Work on Bridge

DESPITE early delays in foundation preparation, when it came to the actual pouring of the 817-foot concrete bridge in Comal County, Texas, on State Route 2, the contractor showed that concrete was his middle name. This attractive structure, designed by the State Highway Department, immediately gives the impression of strength and usefulness without sacrificing the sweeping lines of its arches, and, unlike many products of the modern concrete designer, looks the part it is to play in carrying heavy north and south traffic between Austin and San Antonio.

There are five 120-foot center arches, three 33-foot girder spans with curtain walls giving the impression of arches at the east end and two similar spans at the west end. The maximum excavation for the six center piers was 26 feet. The structure is 817 feet 10 inches long, with a 40-foot roadway, a 5-foot sidewalk on the north side, and with a total width of structure of 49 feet. The deck is 9 inches thick over the long spans and 7 1/2 inches thick over the girder spans. The arches are 31 feet high from the spring line to the bottom of the arch which is 8 feet thick at the spring line and 2 feet thick at the top, and 10 feet 6 inches wide throughout.

Preparation for Work

The Uvalde Construction Co., of Dallas, Texas, contractor for this structure, moved onto the site on June 5, 1934, after receiving the work order on May

Methods of Handling Materials and Concrete on 817-Foot Structure at New Braunfels, Texas

25. The actual award of contract was on May 15, and excavation started June 19, 1934. The first concrete was poured in the east abutment pier July 4, 1934, and the first arch rib completed September 13, 1934, with the last, or tenth, arch finished March 6, 1935.

The steel centering which is shown in the illustration was required to remain in place 24 days after a rib was poured. This centering was assembled piece by piece for each rib and then taken down in the same manner, as it had no bottom chord to permit moving as a unit. The contract was awarded for \$195,856.89 and the working time allowed in the contract without penalty was 220 days.

Concrete Control

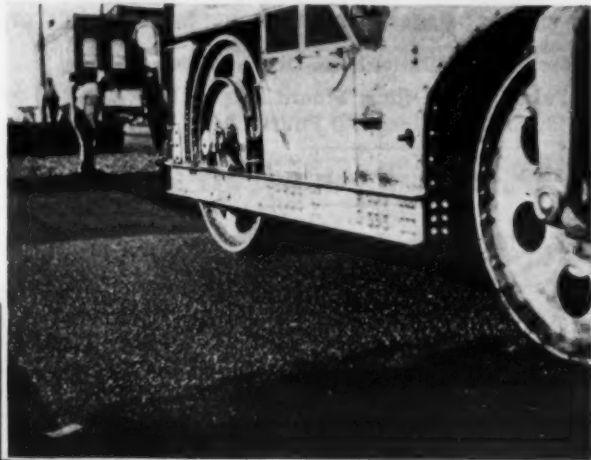
This contract had as complete concrete control and records of every batch weighed and mixed and its final location in the structure as has been seen on recent bridge structures. The batches were designed as close to a 1:2:4 mix as possible and the specifications required a minimum 3,000-pound concrete with 6.2 gallons of water to the sack of cement and 6 sacks per batch. The resulting batches contained 996 pounds of sand and 2,160 pounds of gravel, both loose, dry weights, for the 6-sack batch.



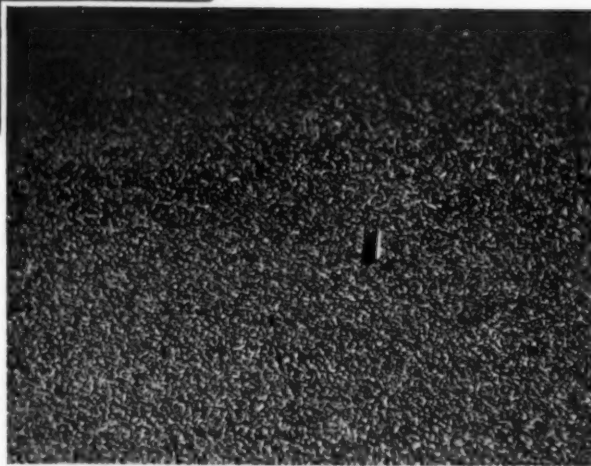
Pouring a Pier



Photographs illustrate the construction of TEXACO Asphaltic Concrete paving in Nanticoke, Pa., during 1935.



—then it's
up to the
asphalt



The engineer skillfully designs the pavement to cope with all conditions to be met. The contractor's experienced organization and modern equipment follow closely the engineer's design.

Then the barriers come down and traffic starts to roll.

How long and economically the pavement will serve depends to a great extent on the quality of the Asphalt which cements it together.

We can point out hundreds of thousands of square yards of paving, which has passed successfully its twenty-fifth winter because the skill of the engineer and contractor has been combined with the durability of TEXACO Asphalt.

TEXACO

CHICAGO
CLEVELAND
KANSAS CITY
HOUSTON
DALLAS



THE TEXAS COMPANY, Asphalt Sales Department,
135 East 42nd Street, New York City



BUFFALO
PHILADELPHIA
BOSTON
RICHMOND
JACKSONVILLE

Contractors and Engineers Monthly

THE NATIONAL BUSINESS MAGAZINE OF THE CONSTRUCTION INDUSTRY!

Issued Monthly by Bittenheim-Dix Publishing Corp.

Publication Office: Mount Morris, Ill.

Editorial and Business Office: 470 Fourth Ave., New York City

TOM DIX, President; EDGAR J. BUTTENHEIM, General Manager; MYRON MALLEO, Advertising Manager; THEODORE REED KENDALL, Editor; GEORGE CONOVER, Vice President; HERBERT K. SAGE, Treasurer

BRANCH OFFICES

Chicago, Ill., Daily News Bldg., Tom Dix, President
Cleveland, Ohio, 648 Hanna Bldg., George Conover, Vice President
San Francisco, Calif., 507 Mills Bldg., Duncan A. Scott

No "Hold-Outs" This Year at A.R.B.A. Road Show

When the American Road Builders' Association "Old Fashioned Road Show" opens in Cleveland on January 20, 1936, there will be no vacancy. Every square foot of space will be taken and every kind of equipment and material used for the construction and maintenance of our highways and streets will be represented.

The list of exhibitors appearing on another page of this issue is assurance that the show will be complete. No group of manufacturers is withholding its exhibit this coming January so that whether the individual is interested in construction or maintenance equipment, from the point of view of the contractor or the state, county or city engineer of highways or streets, he will find an opportunity in the exhibits to secure the liberal education that he can not secure elsewhere in so short a time.

The Convention program itself will be well worth the attendance of all engineers and officials. It is hoped that the sessions this year will be more fully attended because of the particular significance of the topics chosen for special discussion.

Speaking of Roads!

It was our privilege and laborious task this past summer to drive 4½ miles off one of the main pikes in Kentucky to visit some "real folks." To describe the task of driving those 4½ miles is too lengthy for this column. We first pulled out of a mud hole; then, using flat stone picked up along the road, built more than a dozen crossings of streams and pits along the way. It took nearly 1½ hours to make the trip.

On arriving at our destination, we had the privilege of talking with an energetic young man who is Road Supervisor for a town several miles to the south. We inquired whether his roads were in any better condition than those

we had traversed. He shook his head and sadly informed us that they were just about as bad, as he could get no residents to work out their road taxes.

It seems that since relief labor came into existence, the willingness of anybody to work out his road tax has disappeared. "Why work out a road tax when you can get paid for the work" is the thought in the minds of the local citizens. Then, when they found that relief could be secured without work, the roads no longer knew even the touch of pick and shovel manned by relief labor.

The only salvation of this area for transportation is the mule and some roads which have been improved by CCC labor. Even the educational facilities are provided, not by the state or local district, but by a Missionary School supported by churches in the northeastern and north central states.

Worn Out at Last

The following paragraph is quoted from a letter recently received by a manufacturer of construction equipment from one of his dealers. It would seem that we are at last on the threshold of an increasing volume of purchases of new equipment by contractors. This means better work with more profit to contractors and a definite stepping up of production in one of the major capital goods industries.

"In our travels, we find the most encouraging thing is the fact that many of our contractors have reached the point where their old equipment is worn out. The field of obtainable rentable equipment has also been depleted, but, the renting of equipment by one contractor from another still continues. About the only solution to this is to get them all busy so they cannot continue this method.

"Generally speaking, the outlook at present is good for late fall and the entire year 1936."

"I Drive Safely." Do You?

Through what probably has set an all-time record for reprintings, millions of Americans have read in newspapers and periodicals the startling article from *Reader's Digest* entitled "And Sudden Death", by J. C. Furnas. A masterpiece of stark unrelenting realism, recounting to the last gruesome detail the horror and suffering witnessed every day at scenes of traffic accidents, the article has, by sheer shock, aroused the public conscience to the need for more careful driving.

But the mere realization that the "other fellow" should drive more carefully, or even that we ourselves should do something about it is not enough. There are fundamental rules for driving and for the care and maintenance of car or truck which, if disregarded, inevitably lead the way to "Sudden Death", for yourself or some one else. As its contribution to the campaign for greater safety on the highways, the International Harvester Co. of America has prepared a 64-page pocket-size booklet entitled

"I Drive Safely" for free distribution.

Designed particularly as an instruction book for drivers of trucks, it contains so much valuable information that no one seriously interested in street and highway safety should be without a copy. Rules of the road, railroad crossings, speed, brakes, hilly roads, steering, tires, lubrication, vision, pedestrians and lights are some of the subjects treated, all handled in a terse non-technical manner.

We urge you to write today to the International Harvester Co. of America, 606 So. Michigan Ave., Chicago, Ill., for copies, not only for yourself but also enough to distribute to all your truck drivers. They are yours for the asking.

Four states, Minnesota, Missouri, Kansas and Colorado, have adopted constitutional provisions which prevent the use of gasoline tax and motor vehicle revenues for other than highway purposes. We urge a definite campaign to bring about such action in other states.

Money for Grand Coulee Widely Distributed

Where the millions of dollars for Grand Coulee Dam is going is shown in a recent bulletin issued by the Mason-Walsh-Atkinson-Kier Co., contractors for that project.

Amounts totalling \$4,927,917 went directly to eastern and middle western states while an additional \$5,719,737 was spent in the western states for equipment, materials and supplies, a large part of which was manufactured in the east and sold through western dealers.

States receiving money directly were

Delaware	\$ 33,176
District of Columbia	2,600
Illinois	1,487,576
Iowa	72,309
Kentucky	1,199
Massachusetts	2,377
Michigan	53,000
Minnesota	128,678
Missouri	9,940
New Jersey	105,401
New York	1,030,189
Ohio	1,439,470
Pennsylvania	286,721
Rhode Island	1,559
Wisconsin	173,321

Be Safe All the Time

On an excavation job where there were several power shovels and many trucks required, it was necessary that a number of trucks be assigned to each shovel but occasionally a shovel was left idle for a few minutes waiting for trucks to return. During one of these periods an oiler on a shovel decided to climb out on the boom and make an inspection while the shovel was idle. He failed to say anything to the shovel operator before going out on the boom. While in this position he was out of the line of the operator's vision.

While the oiler was on the boom, the truck returned for a load and the operator put his shovel in motion. The dipper sticks caught the oiler and crushed him before anyone knew he was on the boom. Previous instructions had been given to all oilers that they were not to attempt to service, inspect or repair machinery until first notifying the operator. This oiler, of course, had failed to follow instructions, and while "taking a chance" the inevitable happened.

The best instructions are of little help unless someone sees that they are carefully carried out. In some instances, after a mechanical shovel has not been operated for a short time, the shovel operator blows his whistle or rings a bell as a warning to anyone in the vicinity before again putting his machine in motion.

—From the News Letter of the Construction Section, National Safety Council.

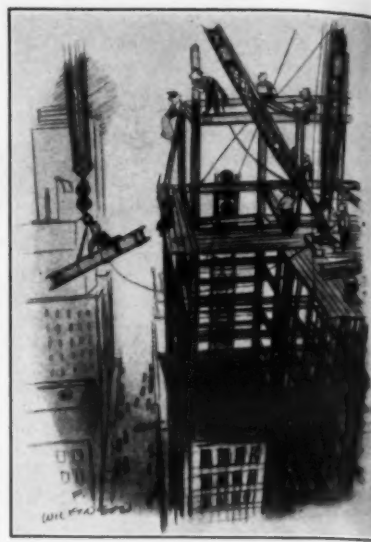
WPA Program Goes Forward During Winter Months

Many projects in the WPA program to employ 3,500,000 men this winter will require the use of concrete in cold weather. By following well established procedure for winter construction, few interruptions need occur, according to the Portland Cement Association.

Certain types of work are better adapted to winter construction than others because they are more easily protected from freezing: construction below ground, swimming pools, reservoirs and sewers; work on ground level, such as sidewalks, curbs and gutters; and low compact structures such as bridges and culverts.

Frequently, with paving projects, installation of underground improvements and the construction of drainage structures and bridges can be completed during the coldest months so that paving can be placed immediately after the frost is out of the ground.

When business runs too smoothly, watch your step; it may be running down hill.



Courtesy, The New Yorker and F. Wilkinson

"Are You the One That Whistled at Me?"

Mass. Closed Season Protects Pedestrians

Conservative New England, appalled at the number of pedestrians killed on highways, is the first region to adopt safety facilities on a large scale for pedestrians on state roads. An \$8,000,000 Federal-State project to construct nearly 1,000 miles of asphalt sidewalks along state highways in Massachusetts has been approved by Arthur G. Rotch, State PWA Administrator, and William F. Callahan, State Commissioner of Public Works. The plan is for the WPA to grade the sidewalks and provide the gravel, while the State will construct the curbstones and surfacing. The State's share of the money, \$4,000,000, will come from a bond issue voted by the recent legislature. The sidewalks will be of 4 and 6-foot widths.

No other state has built highway sidewalks on a scale comparable with that planned by Massachusetts; in fact, there have been no state highway sidewalks to speak of, beyond a relatively few isolated miles in a few states. Capital reports indicate, however, that many other states, spurred by figures showing that 15,590 pedestrians throughout the country were killed by automobiles last year, with 2,690 pedestrian deaths on rural highways, are planning similar WPA projects.

"The Bay State is the logical pioneer for this type of work," said J. E. Pennybacker, Managing Director of the Asphalt Institute, "because it was the first to lay out a system of state roads and its engineers have been the advance guard of the national highway development."

"Other states will follow suit when they realize that nearly 45 per cent of the total number of people killed last year in automobile accidents were pedestrians. Millions have been spent for mankind on wheels, but nothing, or very little, to protect mankind on foot with the result that the pedestrian has become the real 'forgotten man' in our highway development."

"In New York State, for instance, about the only intended aid for pedestrians with the exception of a few sidewalk projects now under way is a law compelling them to walk on the left hand side of the road, which often only means that the pedestrian is hit a little harder than he would be if walking with traffic."

The movement for the construction of highway sidewalks has received its first big impetus from WPA, it is pointed out, because this type of project meets a definite public need, provides much hand labor, and can be carried on to advantage over large sections of the country, providing emergency relief labor for large numbers of people near their homes.

Caravan Routes in Asia Give Way to Highways

(Photos on page 32)

THE countries of Asia with the most highly improved systems of highways are Japan, British Malaya, Netherlands India, the Philippines, Palestine, Syria, French Indo-China and Ceylon, which is clearly reflected in the number of motor vehicles registered within them. While little change is noted in the mileage, most of these countries are steadily reducing the mileage of the lower types of roads and increasing the miles of the higher types, all of which indicates a healthy progress.

China's New Road Program

While China, by far the largest country in Asia, is conspicuous by her absence from the list above, the strides forward which this country has made since the creation of the National Bureau of Public Roads in June, 1932, are notable. Since that time approximately 2,550 miles of surfaced roads and 3,950 miles of earth roads have been constructed and opened to traffic. This has brought into being a connected system of some 8,545 miles in seven central provinces of Kiangsu, Chekiang, Anhwei, Kiangsi, Hupeh, Hunan and Honan. The average cost of this work was about \$2,000 per kilometer.

The influence of the National Bureau of Public Roads during 1934 penetrated into China's far northwestern territory. An engineering office was established at Sian, the provincial capital of Shensi, through which improvement on the 800-kilometer stretch connecting it with Lanchow, capital of Kansu Province, was undertaken. American horse-drawn maintenance equipment was purchased for special use on this work.

Survey work was completed and construction commenced on the Sian-Hanchung route, which when finished will bring the first modern means of communication into that rich farming district in southern Shensi which has hitherto been isolated from marketing centers.

The Director of the National Bureau of Public Roads was loaned to Fukien Province to supervise personally the building of new roads in this southeastern province and to correlate its existing routes, as an aid to stemming the communistic tide with which it was threatened. Through bus service was inaugurated between Foochow, the provincial capital, and Amoy, an important southern port. American armored trucks were used to patrol this important route to provide safe escort for passenger busses and protect them against bandit raids.

At the end of 1933, the Bureau of Public Roads estimated that 44,848 miles of motor highways were open to traffic in the 22 provinces of China proper, Manchuria, outer Mongolia and Sinkiang (Chinese Turkestan) and Tibet. By September 1934, 51,056 miles of highway were open to traffic; additional 8,456 miles were under construction and 32,311 miles projected. Of the total mileage open to traffic, 41,314 miles were within China proper. The policy of the Bureau in concentrating upon the construction of missing links in the existing system has resulted in opening up to continuous traffic thousands of miles of roads hitherto inaccessible.

Two very noticeable features in the development of motor transport during 1934 occurred. Simply constructed wooden barge ferries were placed in operation in many places in lieu of bridging, thus making continuous travel possible. Formerly when large unbridged river crossings were met, bus passengers were transported across by sampans and reembarked upon their

Motor Cars Replace Camels as Planned Road Programs and Modern Road Equipment Improve Highway System

journey in a waiting bus on the opposite side of the river bank. In a 550-mile stretch from Shanghai to Nanchang, the provincial capital of Kiangsi, ten vehicular ferries are in operation, of which only one is self-propelled.

China's motor roads have been used chiefly for military purposes and passenger carrying in the past. During 1934 however, an increased use of the highways for trucking was seen. In the Shanghai area, trucking facilities were inaugurated in the agricultural districts. A cargo carrying service was intro-

duced by the Chekiang Highway Administration between Hangchow and Hweichow, in southern Anhwei, thus giving that section its first modern form of transportation.

Despite monetary stringency, this program of highway construction in China has continued through 1935. Arteries in northwest China and Szechwan Province have been surveyed and work started to link up Shensi, Hupeh, Hunan, Kweichow and Szechwan provinces to facilitate General Chiang Kai-shek's military operations in West China. The 500-mile stretch connecting Sian and Lanchow has been noticeably improved and a regular motor bus service inaugurated. Construction in Chekiang and Fukien has been active, over 600 miles now being under construction in the latter province.

Highway authorities are exhibiting a new interest in maintenance problems and towards this end are experimenting with various types of mechanical equipment. In northwest China, light horse-

(Continued on page 16)



Bureau of Foreign and Domestic Commerce Photo

The Peiping-Tientsin Highway in 1932. Since Then Many Such Roads Have Been Improved Under China's New Road Program.

The CHESTER DIGGING POWER NORTHWEST

Can be checked before you buy

YOU don't have to take anybody's word for the superior digging ability of Northwest Machines.

This superiority is simply plain engineering and can be checked at any time by anyone. It is based on the fact that Northwest brings you—

- ✓ —A crowding mechanism that means digging power plus, because it utilizes power that other shovels waste.
- ✓ —Engines with greater piston displacement than those of other shovels, size for size.

These advantages mean a fast filling dipper that sweeps through the bank without stuttering—without coaxing—a money earning digging ability that you need.

Find out more about it! Send for "Digging Power Plus," an interesting booklet on digging and crowding methods.

NORTHWEST ENGINEERING CO.
130 Steger Building,
Chicago, Ill., U.S.A.

SHOVELS, CRANES, DRAGLINES, PULLSHOVELS, SKIMMERS

NORTHWEST

BUILT IN A RANGE OF 12 SIZES, 1/2 YD. CAPACITY AND LARGER

GASOLINE, OIL, DIESEL OR ELECTRIC POWERED

Arc-Welded Steel Bridge Opened to Public in Ohio

(Photo on page 32)

A new bridge of arc-welded steel has recently been completed and opened to the public in Franklin, Ohio. The structure has three spans, is 140 feet long, 40 feet wide and carries four lanes of traffic. The steel used in the structure consisted of I beams in 6, 12, 24 and 27-inch sizes, with 1/2-inch diamond tread 4x24-foot floor plates.

Two 400-ampere Hobart arc welders were used, the whole job being completed in 800 hours which included supervision, tacking, scaling, etc. The approximate footage on beam welding was 12 feet per hour and the footage on floor plate was about 8 feet per hour, as this welding had to be done in short stretches which cut down the footage somewhat but kept distortion at a minimum. In welding, it was necessary to move about to different parts of the bridge to avoid concentrating heat too much in one portion of the structure.

Plates were cut with a 60-degree bevel and a 1/4-inch gap left between sheets for welding to the beams. The majority of the floor plate welding was made in three passes, the first pass with 1/4-inch rod, the second and third passes with 3/8-inch rod. There were also 1,800 plug welds holding the floor plate to the beams. Approximately 6,000 feet of welding was required on this structure.

Michigan Road Show Has Successful 3-Day Meet

With a better exhibit and better attendance than the majority of the more recent national road shows, the Michigan Road Show at Lansing, October 22, 23 and 24, has been hailed as a complete success. After a lapse of five years, the Michigan Show was resumed in the Demonstration Building of the Michigan State College at East Lansing. With nearly sixty exhibitors and an attendance of over 600 persons at the Wednesday evening banquet, this educational enterprise prepared for the benefit of state, county and city officials and engineers and contractors in Michigan was endorsed heartily by State Highway Commissioner Murray D. Van Wagoner, who furnished an exhibit from the State Highway Department.



Welding Floorplate on the Franklin, Ohio, Bridge

The exhibition was fairly well crowded on all three days and various exhibitors reported that they picked up some very good prospects and made enough real sales to warrant the cost of exhibiting. This Michigan Show is a timely curtain raiser for the National Road Show to be held in Cleveland, Ohio, January 20-24, 1936, the advance

reports of which from the American Road Builders' Association already assure success.

New Thew Dealer in Illinois

The Thew Shovel Co. and Universal Crane Co., of Lorain, Ohio, have announced the appointment of R. C. Larkin Co., 3900 So. Wabash Ave., Chicago, Ill., as distributor of Thew-Lorain shovels and cranes in northeastern Illinois. This company offers complete spare parts and service facilities.

Explosives and The Job

A compilation of the brands of du Pont explosives and the uses to which they are adapted has been prepared by the Technical Section, Explosives Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Thirty-four different classes of work are listed and for each, one or more explosives are listed as recommended in order of

preference. This four-page folder is helpful to any contractor or state highway engineer engaged in either construction or maintenance.

CONCRETE VIBRATORS

Air operated vibrators for all classes of concrete construction including Bridge deck slabs, Dams and Locks, Highway pavement and Concrete products.

Write for circulars and engineering data.

MUNSELL CONCRETE VIBRATORS

997 West Side Ave. Jersey City, N. J.

10 months of 24-hr. operation

with engine up-keep
under 5 mills per hr.

Lyons, France—XAHU 25 hp. Waukesha-Hesselman Engine driving Ingersoll-Rand Portable Compressor which furnishes air for the Jackhamers. Cobet, Freres, Contractors.

● On the new sky way road job in Shenandoah

National Park near Fort Royal, Va., five Ingersoll-Rand Portable Compressors like this, driven by 100 hp. WFH Waukesha-Hesselman Oil Engines, operated 24 hours a day for ten months furnishing air for operation of wagon drills. A total of 29,000 consecutive machine hours! Yet the bill for overhaul, maintenance and repair amounted to only \$210.50, including the compressor itself. Assuming that the engine maintenance was more than half the total, for this strenuous schedule, the cost is still under 5 mills per hour. ● For more than three years Ingersoll-Rand have been shipping these engines with their portable compressors to all parts of the world. And nowhere has it been found necessary to use experienced labor to operate them. A Hesselman is so simple in construction that anyone understanding gasoline engines can operate it. ● Write for Bulletin 1,000.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN
WAUKESHA ENGINES

AMERICAN GOPHER SHOVELS

CRANES

DRAGLINES

A COMPLETE LINE
AMERICAN HOIST & DERRICK CO.
SAINT PAUL MINNESOTA

Advertisement

Contractor and Public Official Report Production with the Austin-Western Badger Shovel

W. R. Sexton, Warden of Effingham County, Georgia, uses Badger shovel for ditch cleaning and back sloping.

"I am glad to say that we are well pleased with this shovel and it has saved this County considerable money. We are moving around four hundred yards of dirt a day in about ten working hours with this shovel, and it is giving the best of service. Of course, it will move much more dirt if it was placed in a pit where we did not have so much bank sloping, but our work consists of practically all ditching, which makes it much harder to get the proper amount of yardage that the shovel could get.

"For a half-yard shovel, don't think it could be beat for County work, as it moves on its own power and can get on most any County road without much difficulty, and the wide gauge it has makes it very convenient to go through soft dirt or boggy places without bogging down."

B. B. McCormick and Sons, Jacksonville, Florida, describe the Badger dragline and clamshell operation:

"The first work with the Austin Badger was with the dragline with a 30 ft. boom and a $\frac{3}{8}$ drag bucket. We were back-filling a sea wall at Ponte Vedra, St. Johns County, Florida. On this job, the highest yardage moved in 10 hours was 700 cubic yards, the lowest was 400 cubic yards. This amount of yardage moved in this length of time was so far beyond our expectations that we checked and rechecked the job, by three different engineers, before we were really convinced that there was not an error somewhere. Since that time, we have worked this machine with the dragline attachment, on five other different types of work, the toughest of which was excavation for the cut-off wall on the Atlantic Beach P. W. A. Sea Wall Project, at Atlantic Beach, Florida. We were excavating on the beach approximately 4 ft. below water level, 18 ft. in width; this excavating was all wet sand, but nevertheless the average yardage was 350 to 400 cubic yards per 10 hour shift—the total yardage on this job was approximately 25,000 cubic yards. We used the shovel head-on a good part of this work, and averaged moving 60 cubic yards a working hour.

"We have this week completed unloading 200 gondola cars of mud for the Commodore Point Terminal Company, Jacksonville, Florida. This work was done with a clamshell. We averaged on this unloading job, 16 to 20 cars in 11 working hours. It seemed so unreasonable that all the white collar boys from the Commodore Point Terminal Company office were standing around with watches checking the operation. We were making from 3 to 5 complete operations a minute with a $\frac{1}{2}$ cubic yard clam on a 50% turn."

Other Features That Speed Up Badger Shovel Output

In addition to the features described in these letters there are many others which are vital in speeding up the output.

41 anti-friction bearings between the transmission and dipper sheave reduce power losses to a minimum.

The motor does not turn on the turntable but is so placed that it acts as a counterweight in digging.

There is no cab to reduce visibility and cause delay in swinging the boom to any desired position.

Advertisement

The elimination of the cab and motor provide a light swinging weight which permits faster starting and stopping.

A further reduction in weight through the use of alloy steel in the boom bucket and dipper stick not only reduce the weight in swinging but permit the use of a full half yard bucket measured from the top of the teeth to the back of the bucket.

A new and highly efficient type of booster clutch, transportation with wheelmounts at motor truck speeds, and ready convertibility from shovel to crane and dragline make the Badger Shovel the outstanding producer in the small shovel field.

Write for complete details of the Badger Shovel construction and operation.

THE AUSTIN-WESTERN ROAD MACHINERY CO.,
Aurora, Illinois

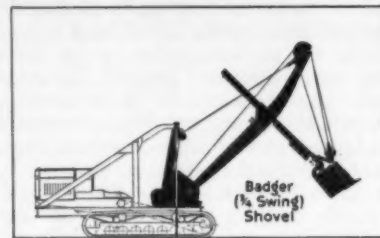
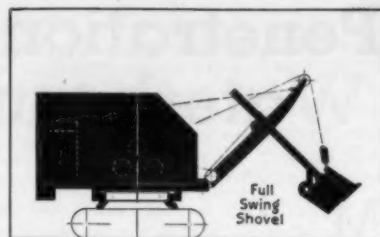
Advertisement

Reorders Prove Badger Shovel Value

Since 1931 the Austin-Western Badger Shovel has met with widespread acceptance throughout the United States, and reorders for additional shovels are proving their worth for contractors and public officials alike.

The A. Blomberg Co. of Minnesota, now has its third shovel in operation; the Potter Dewitt Corporation of Mt. Morris, New York, recently purchased a third, while state highway departments have purchased as many as six of these shovels for jobs which only a small high speed shovel can perform.

It is satisfying to the manufacturer to know that the first shovels have given such outstanding service that old customers again call for Badgers. The improvements in design and materials that are a part of the new Badger not only insure longer life and lower cost of operation but the size jobs which it can handle profitably have been increased.



Parts in black show the mass moved on every swing. Your eye will tell you that a far greater weight must be moved by the shovel at the top. It is obvious that this heavier weight handicaps a full revolving shovel in starting and stopping. One reason for high Badger Shovel output.

JUDGE Any SHOVEL

BY THE DIRT IT MOVES

● The job is to move earth quickly and the Austin-Western Badger does it at the lowest possible cost. Here are the principal design features which give this small shovel big capacity. Notice how they all contribute to fast low-cost earth moving. Then write for the new shovel catalog.

1. **Speed** in starting and stopping each swing is as important as the speed of the swing itself. In order to reduce inertia to a minimum only the boom, bucket, and dipper stick are turned while the shovel is in operation. In this way all tail swing is eliminated. Dead swinging weight is held to a minimum.
Ample power and braking allow the shovel to be operated as fast as the hand and eye of the most skilled operator permits.
2. **Stability.** In the effort to build a mobile unit the necessity for a shovel that could dig was never lost sight

of. Experiments showed that a low center of gravity and a weight of eleven tons provided ample stability for digging in the hardest soil.

3. **Mobility.** The Badger's over-all size and weight permits hauling on the roads of any state by means of a trailer or by rubber tired wheel mounts.
4. **Bucket Capacity.** All Badger Shovels are now built with buckets of 12 cubic foot capacity struck measure [heap measure 13.5 cubic feet]. The use of light alloy steels for boom, bucket, and dipper stick have made this increased capacity available without any loss in speed, the saving in dead weight being applied towards a larger pay load.

The Austin-Western Road Machinery Co.
Home Office: Aurora, Ill. Cable Address: AWCO, Aurora
Branches in 14 Principal Cities

ROAD GRADERS • MOTOR GRADERS • ELEVATING GRADERS • DRAGS

Austin-Western

BITUMINOUS DISTRIBUTORS • ROAD-MIX MACHINES • CULVERTS
SCARIFIERS • BULLDOZERS • TRAILERS • SCRAPERS • PLOWS

CRUSHING AND WASHING PLANTS • SWEEPERS AND SPRINKLERS • SHOVELS • CRANES • ETC • SNOW PLOWS

The Austin-Western Road Machinery Co.
Y, Aurora, Illinois

Please send your new Badger Shovel catalog.

Name 1935

Address

City State

Country

DUMP CARS



Penetration Top Laid on Waterbound Macadam

(Photo on page 32)

MEASURES for the safety of the laborers, devices for the checking of the work as it progressed and the genial personalities of the men responsible for the completion of the work by the contractor, DeSalvo Construction Co., of Cincinnati, Ohio, were the highlights of the 2.5-mile penetration macadam project south of Venice, Ohio, last fall and the spring of 1935.

Russell DeSalvo is one of the keenest men in watching the progress of a contract and he sees to it that the ingenuity of his brother is used to the full in developing devices for the better prosecution of the work. He pointed with pride to a simple device on the spreader boxes which has done away entirely with accidents when the men are hooking or unhooking the boxes from the trucks. Brother Anthony designed and constructed the spreader boxes which are somewhat larger than most seen on work of this type, chiefly because it is possible to pull a larger amount of slag than of the heavier stones used in other sections.

DeSalvo also uses 6-inch channel forms at the sides of the base courses set to grade and then uses a template on the forms to check the subgrade before any stone is spread and after the stone is placed, and both before and after rolling the surface is checked with a special template.

The Base Courses

Roughly half of the project was over an old bituminous macadam roadway that was salvaged and used as the first base course although it was necessary to widen it to the standard 21 feet for the base course. Each base course was of the same width, with a 2-inch crown except on the superelevated curves. The penetration course was 20 feet wide with the same crown. A considerable portion of this project was over new fills from balanced cuts and also from borrow pits. The fills were spread and finished with a Caterpillar Twenty power grader with 10-foot blade in 8-inch loose courses and rolled with 10-ton rollers.

The coarse aggregate was slag from a Koppers coke plant distributed by the American Aggregate Co., and hauled 15 miles from New Miami, Ohio, by four Mack trucks owned by the contractor and eight hired trucks. For the first base course, which had a specified compacted thickness of 5 inches, the slag was spread 6½ inches deep loose, allow-

2.5-Mile Job in Ohio Completed by DeSalvo Co. with Slag for Aggregate and Side Forms for Base

ing 25 percent compaction, and then four men hand-trimmed and carried slag back by hand and wheelbarrow to fill in the extra 6 inches on either side as the boxes spread it only 20 feet wide and the base courses were 21 feet. These men used "potato diggers" stone forks for all hand trimming.

The second base course had a specified thickness of 4 inches and the slag was spread 5¼ inches loose. The construction was identical to that of the first base course.

The slag was then rolled with one or

more of the battery of heavy rollers on the job, one 12-ton Galion, one 10-ton Galion, both gas-operated, or a 10-ton Buffalo-Springfield gas roller. The rolled slag course was then filled with ¾-inch to 100-mesh sieve-size limestone screenings hand-cast by 8 to 10 men over the surface just to fill the voids. The rolling was continued with four successive light coats of dry screenings until the voids and top were completely filled with the screenings.

The next step was the pulling of a steel wire gang broom attached to the roller over the surface to insure a perfectly uniform spread of the dry screenings. Then a watering truck was brought into service and the rolling and gang-brooming continued until the surface had a slight grout wave ahead of each of the rolls. After this first base course had dried out completely it was roughly broomed with a rotary broom pulled by a truck to clean it for the spreading of the second base course.

The slag for the first and second base courses was mixed No. 1 and No. 2



C. & E. M. Photo

The First Base Course of Slag Rolled and Before Screenings Were Spread

sizes or sieve sizes varying from 100 per cent passing the 4-inch to a maximum of 15 per cent passing the 1½-inch.

The Penetration Course

The 3-inch penetration course was (Continued on page 12)

Bring Your Power Problems to International Harvester

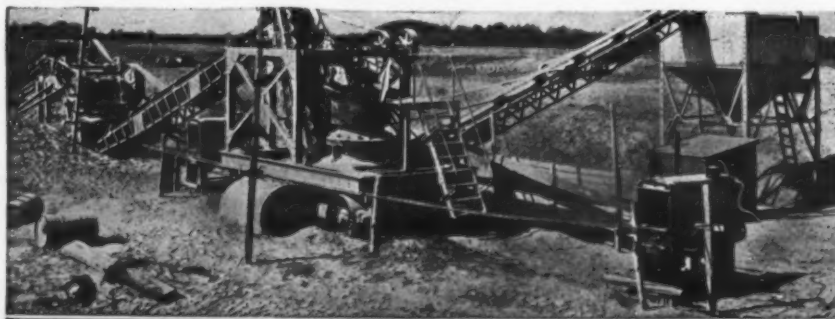


International Harvester tractors and power units are first-line equipment on highway construction and maintenance. Here is a wheel-type tractor pulling a big grader.

INTernational HARVESTER—largest tractor builder in the world—has been in this industrial power business a good many years. Its engineering, manufacturing, distribution, and service policies are keyed to the needs of industrial power users. If your work calls for crawler tractors, wheel tractors, stationary power units, or power for a variety of mobile equipment, depend on the International

Harvester line for the utmost satisfaction in performance and economy. Crawler tractors and power units are available with gasoline or Diesel engines. Let an International branch or industrial distributor work out your power problems. Write us for information.

INTERNATIONAL HARVESTER COMPANY
606 S. Michigan Ave. OF AMERICA (Incorporated) Chicago, Illinois



At left: Two International Harvester Diesel power units operating portable crushing plants for W. C. Burns near Driggs, Idaho. Mr. Burns, prominent road contractor of Idaho Falls, purchased these Diesel units because of their high combustion efficiency in the rarefied mountain air. The elevation at this point is 8000 feet.



Three Types:

Multiple-Rope, Power-Arm, and Dragline

Famous for output, long life and dependability. A size for every earth-moving requirement.

Write for bulletin.

THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio

WILLIAMS BUCKETS

INTERNATIONAL HARVESTER

Calif. Plans Elimination of 39 Grade Crossings

With \$7,500,000 Federal funds, California is planning to eliminate thirty-nine of her most hazardous railroad grade crossings. The projects submitted to the U.S. Bureau of Public Roads for approval include fifteen on state highways outside of cities, ten on state highways within cities, twelve on other city streets, and two on county roads, all of which include one or more grade crossing separations and such road connections as may be necessary in order to construct them properly, it is reported in *California Highways and Public Works*.

The oft-repeated statement that grade separation projects are the easiest to get under way within a short period of time is, to put it mildly, a slight exaggeration. There are many problems, not only of planning and design, but bickerings with local officials, property

owners, and others, before such a project can go ahead.

The Division of Highways of the California Department of Public Works has, however, bent every energy to get as many contracts as possible on this work awarded by December 15, and expects to have a large proportion of the work under contract on that date.

Acetylene Association Meets in Cleveland

The International Acetylene Association held its 36th Annual Meeting in Cleveland last month. The keynote speaker of the occasion was Merle Thorpe, Editor of *Nation's Business* and other outstanding executives and engineers spoke on the various phases and advances in the industry.

One of the features of the meeting was a welding and cutting forum, at which numerous demonstrations were made and opportunities for discussion and questions were made available.

A. G. C. Makes Nominations and Foresees Better Times

The Seventeenth Annual Convention of the Associated General Contractors of America will be held at the Miami Biltmore Hotel, Miami, Fla., January 13, 14 and 15, 1936. The formal nomination of William A. Klinger, Sioux City, Iowa, as President and Edward P. Palmer of New York City as Vice President of A. G. C. has been announced. Mr. Klinger is President of the William A. Klinger Corp., prominent mid-west building contractor, and Mr. Palmer is Secretary-Treasurer of Senior & Palmer, engineering contractors of New York.

Edward J. Harding, Managing Director of the Association, states that, "Every recent statistical study makes it quite apparent that the volume trend in the field of private construction has definitely headed upward, that it may be expected to continue its upward trend, and that the trend will be ac-

celerated."

Harding estimates that there is an accumulated deficit of at least eighteen billion dollars in private construction over the period of the last five years, and that the recent upward trend may be viewed as a seepage through that must soon break the dam which has pent up this demand.

Daniels Heads Division for FWD Eastern Sales

H. M. Daniels has been appointed Supervisor of the new consolidated Eastern Sales Division and A. F. Waterland, Manager of the newly established Philadelphia Branch of the Four Wheel Drive Auto Co., of Clintonville, Wis.

Daniels has been manager of the New York Branch for over twelve years prior to which he was foreign sales representative in China, Java and the Far East. Waterland has had ten years of successful experience in the foreign and domestic sales of FWD trucks.

OUR BEST SELLING IS DONE

"Out there in the Rough"

Out where men face rugged facts. Where men and machine buck tough jobs and stay with them—see them through. It's out there that engineers see the stamina of the Link-Belt. In such places the machine that's built right carries on to the finish—efficiently, and saving money by dependable performance. The Link-Belt Shovel, Crane and Dragline sell themselves best in action.

From 3/4 to 3 yards capacity, heavy-duty built. Gas engine, Diesel, or electric motor drive. All models can be shipped loaded on a flat car without dismantling.

STABILITY-POWER-SPEED

LINK-BELT

SHOVEL-CRANE-DRAGLINE

LINK-BELT COMPANY
300 W. PERSHING ROAD
CHICAGO

Offices and Distributors in All Principal Cities

Lubrication Queries

Is some lubrication problem bothering you? Tell us about it and we shall be glad to help you.

Question

We operate heavy-duty tractors which are powerful machines. One of the salesmen who calls upon us insists that we should not use heavy lubricants in the transmission of these machines. We think he is "all wet." Please give us your unbiased opinion.—Garden City, L. I., N. Y.

Answer

The salesman, whether he represented a refiner of lubricants or a manufacturer or distributor of heavy-duty construction equipment, was correct. Most operators seem to believe because the machine is labeled, "heavy duty" that they need a "heavy" lubricant. This problem is particularly serious in the case of the lubrication of transmissions. The Caterpillar Tractor Co., one of the large manufacturers of heavy-duty tractors, has never recommended anything heavier than SAE 160 transmission oil for use in their tractors. Even this is much too heavy in the winter time and so they recommend either SAE 90 or 110 for winter use. Since the tooth pressure per square inch in the transmission is comparatively low in a tractor, the lubricant does not need to be heavy. It is much more important for the lubricant to circulate freely so that not only the gears but also the bearings will receive proper lubrication.

Question

Our internal combustion gasoline engine is quite new but has been operated almost continuously for about six months. In order to overcome possible wear in the cylinders we have been using a heavier oil, but the machine seems to be losing power. We are using a lighter oil, an SAE 40, this winter but with the colder weather this does not seem to overcome our loss of power. What oil should we use?—Los Angeles, Calif.

Answer

Because of the great improvement in the quality of machine shop work involving closer fit and the speeding up of equipment, many contractors are using too heavy a grease or oil and your case is not an isolated one. Internal combustion engines particularly are increasing in speed, they are of higher compression and tighter fit in their cylinder walls, necessitating the use of a thin oil of SAE 20 or 30. Even old-time service men are still prone to use as heavy an oil as they did when the clearance was much greater than it is today. The engine manufacturer's bul-

letin provided with each engine you buy gives you his recommendations for oil. These recommendations should be followed carefully. If you have lost his book, write for another one.

Minnesota WPA Program Financing Gravel Road

The Minnesota State Highway Department since October 1 has called for bids for the improvement of more than 175 miles of its secondary system. This program is designed to furnish maximum man-hours of employment consistent with worthwhile improvement and will be financed to a large extent from Minnesota's \$5,000,000 allotment of WPA funds. More than 115 miles of stabilized gravel base course, 47 miles of grading and 13 miles of ordinary gravel will be built. Lettings scheduled at two-week intervals include additional mileage not listed above.

In most cases, the stabilized gravel projects involve improvement of the

grade as well as the addition of aggregate, binder soil and calcium chloride for the wearing course. The Department has been doing stabilization experimentally for the past year and has found that the new type of surface is satisfactory under moderate traffic conditions and forms a good base for added surfacing of other types if it should be required. Some of the grading will be carried on during the winter months.

"Jack" Distler Joins Republic

The Republic Steel Corp. has announced the appointment of J. P. Distler, formerly with Keystone Steel & Wire Co., as Manager of Sales for its Wire Division, with headquarters at the Grand Crossing plant in Chicago. Mr. Distler succeeds R. W. Hull whose duties as Assistant Manager of Sales for all Republic products in the Chicago district will receive all his time.



Sauerman Slackline dumping sand and boulders on pile.

Low Cost Excavating

When you have a contract that requires moving dirt several hundred feet or more, isn't it logical to use a machine that will reach the entire distance and eliminate rehandling? Sauerman Slacklines and Drag Scrapers will do just that—reach from 100 to 1500 ft. and handle the digging, hauling and placing of the dirt in one operation.

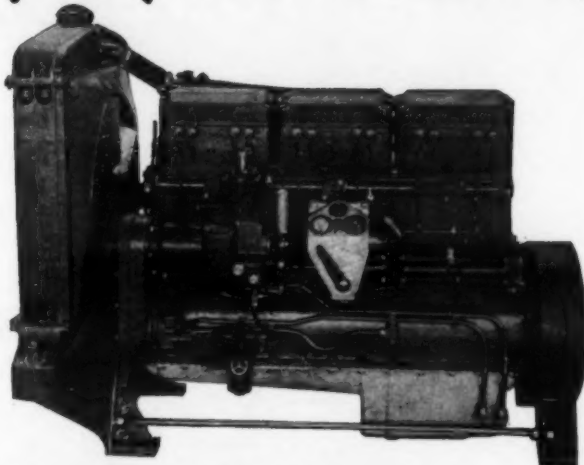
Write for new Catalog

SAUERMAN BROS.
464 S. Clinton St., Chicago



Small Sauerman Scraper making a highway cut-and-fill.

Read the record



Model HI-6
85 h. p. at 1200
r. p. m.

MODERN PRIME MOVERS must be flexible and economical

Industrial modernization demands a prime mover that is both flexible and economical. An engine that will deliver uniform dependable power, under varying conditions, with clock-like regularity. An engine that will operate with the minimum fuel cost.

The Cummins principle of single-pump fuel control meets these conditions and is recognized by engineers as the foremost improvement in Diesel engines. Only by the exact metering of each fuel charge through a centralized control can you secure the maximum in Diesel flexibility and economy.

The proven record of Cummins-Diesels operating successfully in a wide variety of industries, verifies the wisdom of choosing the Cummins-Diesel for your prime mover.

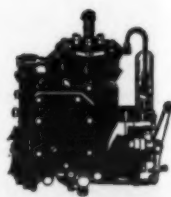
See your nearest Cummins dealer or write direct to

CUMMINS ENGINE COMPANY
COLUMBUS, INDIANA

CUMMINS

INDUSTRIAL • AUTOMOTIVE AND MARINE

DIESELS



"Read the Record"
... it's an open book on the performance of Cummins-Diesels. . . Ask for Bulletin QA-273.

THE NATIONAL CARBIDE V-G LIGHT

Gives you daylight conditions on night jobs. Spreads a full, even beam of 8000 candlepower right where you need it.



Lights up the job for twelve hours on one 7-pound charge of National 14-ND Carbide and 7 gallons of water. Is easily handled by one man; has nothing to get out of order; no harm done if it tips over—just stand it up again, and it goes right on working. Weight 35 lbs. empty; 98 lbs. when full.

Write for catalogs on V-G Light, V-G Handy Light and Lanterns

NATIONAL CARBIDE SALES CORP.
LINCOLN BLDG., NEW YORK
(Opp. Grand Central)

Snow Removal Problems in Sunny California

(Photo on page 32)

IT MAY not ever rain in California, but it certainly snows! In spite of the happy picture of everlasting sunshine and orange blossoms which the word California is supposed to call to mind, the State Division of Highways has 4,500 miles of road to keep clear of snow during the winter season.

Last year they were confronted with the problem of the worst snowfall in 12 years. The range of the storm was exceptional, with 4 inches of snow falling at Eureka where a measurable depth of snow is seen only once in a generation, to a maximum fall at Donner Summit where in four days the snow pack was increased by 88 inches, as reported in *California Highways and Public Works*.

The storm was general throughout the state. Adding to the fierceness of the storm was the accompanying wind, reaching at times a hurricane velocity of 60 miles an hour.

Fortified by Good Equipment

The efforts of the Division of Highways were greatly fortified by an excellent layout of equipment, totaling 293 pieces, ranging from V-type pusher plow motor graders to large auger-blower type rotaries, and in addition, many tow graders, tractors and power graders for the lighter falls.

Equipment was not allowed to stop, operation being continuous in some places for 175 hours, with time out only for servicing. A vital help during the emergency was the equipment purchased the preceding fall to replace obsolete units.

During the storm, superintendents, foremen and leading men lost all track of days and hours. Truck drivers and equipment operators took their equipment out and kept it moving until a round trip was made, or until they were relieved.

The greatest trouble was experienced in the high-plateau sections east of the mountains, where high winds and resulting drifts were responsible for blocking several roads for short periods. U.S. Route 40, from Colfax over Donner Summit to the Nevada State line, was the most difficult route to keep open, largely on account of drifting snow. On this section, ten four-wheel-drive trucks with pusher plow attachment, three auger-blower and one railroad type rotary plows were operated.

With this equipment working constantly, the road was kept open, although for five days, on account of restricted width, it was necessary to close the road to trucks and to convoy light traffic over the summit under patrol car control.

Almost as difficult as the Donner Route was a portion of the East of the Sierra Highway. On 140 miles, from the Nevada State line to Bishop, three

State Division of Highways Has 4,500 Miles of Road to Keep Open in Winter

summits are crossed, ranging up to 8,100 feet in elevation. The snow here was light and dry, and when driven by strong gales necessitated the continuance of snow removal operations long after the actual snowfall had ceased. Seven truck push plows and two auger-blower type rotary plows were used to keep this road open to traffic.

Snow Fence Effective

As usual, the greatest trouble was experienced at points unprotected by forest or snow fence, where howling winds reformed drifts on the roads almost as rapidly as they were cleared.

Long stretches of snow fence have been installed where drifting was serious. But last winter's storm shows that considerably more will be required to control adequately the action of the wind.

Pacific Coast Branches United

Through the selection of Edward M. Ornitz as their Pacific Coast special representative, a group of manufacturers of construction equipment have brought about a more direct cooperative effort between the manufacturers, their distributors and contractors in that territory. The companies represented by Mr. Ornitz are: Blaw-Knox Co., Pittsburgh, Pa.; Byers Machine Co., Ravenna, Ohio; Cleaver-Brooks Co., Milwaukee, Wis.; E. D. Etnyre & Co., Oregon, Ill.; and Master Vibrator Co., Dayton, Ohio. Mr. Ornitz is maintaining offices in the Wilcox Bldg., Los Angeles, Calif.

New Chain Belt Dealer

The O. S. Stapley Co., 723 Grand Ave., Phoenix, Ariz., has recently been appointed exclusive distributor by the Chain Belt Co., for its line of Rex construction equipment in and about the vicinity of Phoenix. The Stapley organization has been serving the construction industry and state and county officials in that territory for many years.

**TENTS
TARPAULINS
WINDBREAKS**

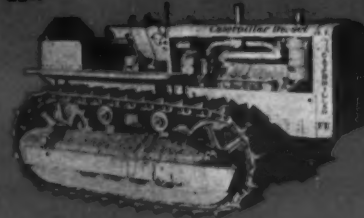
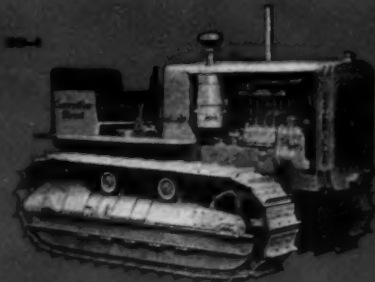
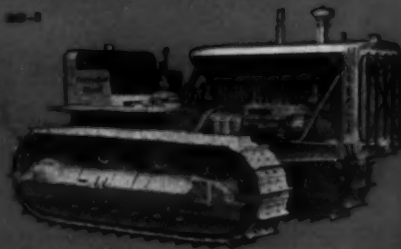
The Fulton line is sold through Contractor Supply Dealers in every state. A quality line priced right. Ask for SHUREDRY and FULTEX Tarpaulins, Tents, Windbreaks. Write our nearest plant today for catalog, samples and price list.

Fulton Bag & Cotton Mills

MINNEAPOLIS ST. LOUIS DALLAS
ATLANTA BIRMINGHAM NEW ORLEANS KANSAS CITY SAN ANTONIO

FIRST

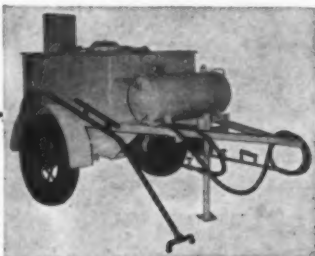
IN POWER PERFORMANCE SAVINGS



Over 10,000 "Caterpillar" Diesels are saving money for their users. . . . Now, new models offer more power, greater work-production, bigger savings than ever before. . . . New models, topped by the RD-8, biggest, most powerful tractor on the market today. . . . New models including a smaller size, RD-4 (deliveries begin in February, 1936) that extends "Caterpillar" Diesel advantages to new thousands of tractor users. . . . New prices, offering more usable horsepower per dollar of purchase price than ever before in tractor history. . . . Now is the time to replace your present obsolete power. . . . Let your "Caterpillar" dealer prove to you, by facts, figures, demonstration, that these new tractors are the biggest values in the power world today. . . . Get the SHOW-DOWN! Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

DIESEL



TAR KETTLES

Fire Proof—Oil Burning
Hand and Motor driven spray.
Many sizes. Write for catalog.

White Mfg. Co.
Elkhart Indiana

2.5-Mile Penetration Job on Waterbound Macadam

(Continued from page 8)

built up with 4-inch loose No. 2 slag of sieve size varying from 100 per cent passing 3-inch to a maximum of 15 per cent passing 1½-inch sieve, hand-trimmed and rolled to 3 inches compacted. Any irregularities greater than ½-inch when tested with an 18-foot straight-edge when applied parallel to the center line of the pavement were loosened and reshaped with the same size and kind of material and again rolled.

It was then penetrated with A-1a petroleum asphalt manufactured by the Latonia Refining Co. of Latonia, Ky., at the rate of 1.2 gallons per square yard. The asphalt used had a penetration of 85-100. The petroleum asphalt was supplied by the L. P. Cavett Co. of Lockland, Ohio, who delivered and applied it with heated Etnyre distributors. Immediately after applying the bituminous material there was spread evenly by hand over the entire surface sufficient No. 4 chips, of sizes varying from 100 per cent passing a 1-inch to a maximum of 5 per cent passing a No. 4 sieve, approximately 15 pounds per square yard to fill the surface voids. The rolling and sweeping of this course was started before the bituminous material stiffened enough to prevent the chips from being readily incorporated. Immediately after the completion of the work described above, the road was penetrated with the same type of bituminous material at the rate of 0.6 gallon per square yard and No. 4 chips were again uniformly spread over the entire surface at the rate of 15 pounds per square yard. The entire surface was rolled and swept in the same manner as after the first application of bituminous material. The surface was tested with an 18-foot straight-edge applied parallel to the centerline of the road and any irregularities ½-inch or greater were corrected.

Sealing

To secure a smoother surface, both seal coats were combined. Prior to sealing, the entire surface was thoroughly cleaned with the rotary broom. Then there was spread uniformly over the entire surface No. 46 chips, varying in size from 100 per cent passing a 1-inch sieve to a maximum of 15 per cent passing a No. 4 sieve, at the rate of 37 pounds per square yard which was dragged to a smooth surface by the spreader boxes used for the first two courses. The asphalt cut-back No. 2 manufactured by the Latonia Refining Co. was applied at the rate of 1.1 gallons per square yard by the Etnyre distributors. The chips and bituminous material were then bladed over and back and then leveled with a Caterpillar blade grader and the entire surface dragged with an Adams blade mixer and leveler, 22 feet in length, which gave the desired coating of bituminous material, and surface smoothness.

The surface was then rolled lightly

and any irregularities exceeding ¾-inch in a 10-foot straight-edge applied parallel to the centerline of the road were eliminated. The surface was next covered with No. 6 chips, varying in size from 100 per cent passing a ½-inch sieve to a maximum of 5 per cent passing a No. 8 sieve, at the rate of 8 pounds per square yard; then rolled and broomed until the No. 6 chips were thoroughly embedded.

Quantities

The major quantities of materials involved in this contract were:

Excavation, unclassified	23,466 cubic yards
Excavation, borrow	22,763 cubic yards
5-inch waterbound macadam, first base	19,619.9 square yards
4-inch waterbound macadam, second base	31,333.7 square yards
Waterbound macadam leveling course*	800.0 cubic yards
T-33, 3-inch bituminous macadam surface penetration	30,081.0 square yards

*For widening the old macadam pavement used as the first base course for a portion of the work.

The contract was worked 40 hours a week, being wholly a state highway project. The 8-hour day of the state

law was followed, working 5 days a week.

Unusual Service Lengthens Tire Life

The contractor equipped his entire fleet of trucks with General tires and then had them serviced by the local distributor. Once each week the distributor sent out a service truck with a large container of air under high pressure and examined every tire for under-inflation, over-inflation, bruises from stone or other cause, and made the proper repairs at once, changing the tire if necessary to make the needed repairs. The contractor reported that this service had lengthened the life of tires on his equipment by many months.

Personnel

This contract was completed by DeSalvo Construction Co. of Cincinnati, Ohio, with Russell DeSalvo, Anthony DeSalvo and Louis Iori in charge. For the State Highway Department the work was under the jurisdiction of W. E. Willard, Resident Division Deputy Director, and R. S. Fisher, Assistant Resident

Division Deputy Director in charge of construction, and was under the direct supervision of Harold Mathes, Project Engineer, with John W. Tallman and Prosper Russo as Chief Inspectors.

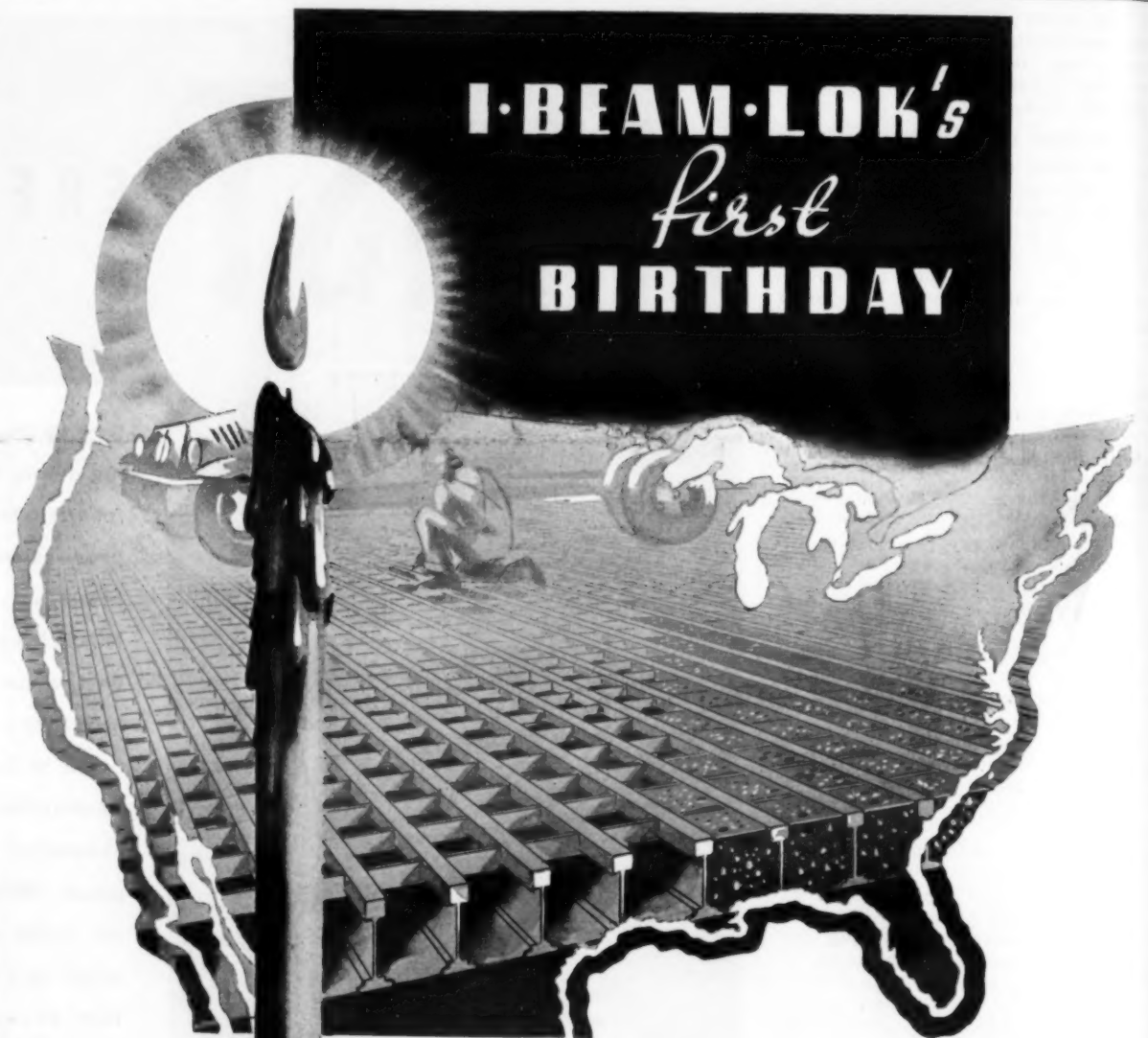
WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets



I-Beam-Lok Bridge Flooring has completed its first year in service. 33 installations, totaling 235,338 square feet, or enough to surface 2.47 miles of bridge floor 18 feet wide, indicate the splendid acceptance this product has had with engineers and contractors. The reasons are many. In new construction the light weight of I-Beam-Lok permits a saving in weight in the entire structure. In resurfacing old construction, increased floor loads are very frequently possible without change in the supporting structure. In all construction, new or old, I-Beam-Lok provides an armored, anti-skid roadway of long life and high efficiency. Inquiries for literature or engineering data will receive immediate attention.

CARNEGIE-ILLINOIS STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

CHICAGO, ILLINOIS

United States Steel Corporation Subsidiary



For the Largest and Smallest Jobs

Write for Catalog describing the complete "Coo-weigh" line of dependable anti-friction, troughing and return idlers, trippers and monorails. They will measure up to the most rigid requirements of the largest as well as the smallest job.



PORTABLE MACHINERY CO.

Division of A. B. FARQUHAR CO., Limited
Box C-1, York, Pa.

County Produces Gravel for Roads at Low Cost

A county road commission in a section popular with vacationists is faced with two problems: that of maintaining the secondary roads under its jurisdiction to meet the requirements of the residents of the community and in addition, keep the roads in a condition to accommodate the heavy summer traffic.

The Leelanau Road Commission, in Leelanau County, Mich., faces just such a problem, and several years ago set about to establish a basis of economical maintenance and extension of its highway system. They acquired gravel deposits in various sections of the county and put into operation a 1-yard Sauerman power drag scraper and a portable crushing and screening plant. After one year's successful operation of this unit, a second Sauerman scraper was added to the outfit.

The gasoline-driven hoists of the scraper units are mounted on steel road trucks and the entire plant can be moved easily from one pit to another to supply material to any part of the road system where work is under way. The various pits are from 10 to 30 miles apart.

Most of the gravel deposits are hard-packed with a liberal sprinkling of boulders. The 1-yard Crescent bucket moves 40 to 45 cubic yards of gravel an hour when operating at the machine's average length of haul of about 150 feet. When operating on the full length of its 300-foot span, the bucket digs and hauls about 25 cubic yards an hour. It is reported that the operating cost, labor and gasoline only, is less than \$10.00 a day.

The pit material is conveyed by the scraper to a hopper feeding a short-center belt conveyor leading to the screen, where oversized material is scalped off, chuted to a crusher, and returned to the screen by a bucket elevator. All material passing the screen is carried by a somewhat longer conveyor belt to a steel storage bin from which it is loaded to trucks.

In addition to serving as a gravel excavator, one of the scraper units has been used by the county forces for other excavating work. One season it made a 50,000-cubic yard cut and fill for a new road through the Lake Michigan sand dunes.

Miller Bidleman is County Highway Superintendent for Leelanau County and J. Baumgardner is Foreman.

Salt Brine as Dust Layer

The Michigan State Highway Department has been experimenting since the summer of 1934 with salt brine as a dust layer. The brine, which is a waste product of oil wells, contains chlorides of sodium, calcium and magnesium. It is hauled in trucks from the ponds. M. D. Van Wagoner, State Highway Commissioner, states that the experimental results indicate that the cost of one treatment, with a haul of not over 30 miles, will not exceed \$25.00 per



One of the Set-Ups of the Leelanau County Portable Gravel Plant

mile and it is estimated that four applications per year will be required.

Minnesota Ready to Battle Winter Storms and Snow

According to a recent report from the Minnesota Highway Department, every corner of the state is "digging in" for its annual battle with winter's snow storms. More than 1,100 miles of snow fence is practically all in place. More than 200 big V-plows are being attached to the department's heavy-duty trucks. Fifteen tractor plows and twenty-one rotary plows are tuned up and ready to force their way through deep drifts.

Piles of gravel—more than 10,000 cubic yards—are in strategic locations waiting to be spread on icy pavements. For mixing with this there is 100 tons of calcium chloride which helps the gravel to imbed itself firmly in the ice and thus provide traction for slipping tires.

Maintenance workers of the Highway Department must keep more than 11,300 miles of state highways open. During

storms, crews work continuously.

PILE HAMMERS
and
EXTRACTORS
HOISTS - DERRICKS
WHIRLERS

Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs.

McKIERNAN-TERRY CORP.

19 Park Row, New York

Distributors in Principal Cities

KOEHRING

On the
Aqueduct

KOEHRING HEAVY DUTY construction equipment is operating 24 hours daily on the immense project of constructing the Metropolitan Water District Aqueduct — through the mountains and over the deserts of California. It is digging ditches and canals, handling material, and mixing concrete. Koehring draglines, cranes, construction and paving mixers, operating on this job of varied and strenuous requirements, are establishing records of high production and low operating costs.



KOEHRING COMPANY

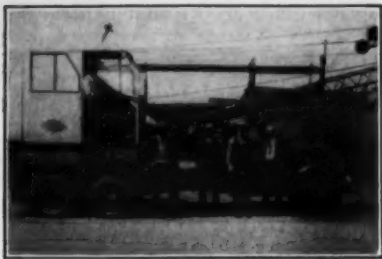
Pavers - Mixers - Shovels - Cranes - Draglines - Dumpers - Mud-Jacks
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

The WEBSTER
40 WEST 45th ST.
NEW YORK CITY

After an exciting day
in NEW YORK... go
to a quiet HOTEL

ON A QUIET STREET—JUST OFF 46th AVE.
A refined atmosphere
Convenient to shops, theaters and points of interest.

ROOM \$2.50 BATH
VICTOR H. ALLING, MGR.
FORMERLY OF THE MANHATTAN HOTEL



A Special Truck-Mounted Excavator Owned by Matthew Sullivan, New York City, Contractor

Special Excavator Powered by Ford V-8

A P & H fully-convertible excavator, made especially by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., for operation by a Ford V-8 motor, is used by Matthew Sullivan, Inc., contractor of New York City, for a variety of jobs.

The Ford V-8 chassis on which the excavator is mounted is equipped with a Twin-Flex unit, sprocket and chain drive. Running slowly, the engine operating the excavator develops 40 hp at 1,800 rpm. At the press of a button, the motor is ready for action and is capable of developing 85 hp. The contractor reports that operation and maintenance costs are low.

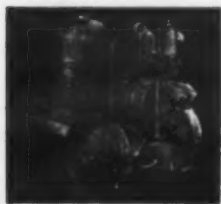
New Sizes of Batteries Fill Truck Service Gap

Three new storage batteries for replacement in light trucks to fill the gap between passenger car type batteries often used in light trucks, and the heavy-duty batteries for large trucks and busses have been announced by the B. F. Goodrich Co., Akron, Ohio. Differing from passenger car batteries in construction, the new batteries are able to withstand the severe operating conditions of light truck service, and are little more expensive than passenger car types. Positive plates in the new products are twice as thick as those in the passenger car type, while the negative plates are similar to the passenger car batteries. The electrical capacity is increased by an extra large acid space and the extra acid tends to keep the temperature of the battery below the critical point.

Plant Leased by Dealer for Larger Display Area

B. C. Patten, President, Patten Tractor & Equipment Co., 431 S. Jefferson St., Chicago, Ill., has announced the leasing of the Carlson Forging Co. plant at 1056 N. Kolmar Ave., Chicago for a long term. Extensive alterations are to be made and the plant occupied by December 15. The property is served by a Chicago & Northwestern switch track.

This Caterpillar distributor will now have a floor area in excess of 20,000 square feet, making it possible to carry a complete floor and display stock. Service and parts department facilities will be greatly enlarged and improved, and various features will be installed for the convenience and comfort of customers.



Dependable 2" to 8" Self-Priming PUMPS

The choice of Contractors from coast to coast

Write for copy of our combined catalog and valuable bulletin of engineering data — sent FREE on request.

Sterling Machinery Corp.
411-15 Southwest Blvd., Kansas City, Mo.

A Horizontal Boring Unit Installs Pipe Under Roads

A horizontal earth boring machine has been developed by the Young Engine Corp., of Canton, Ohio, for installing casings of 4 to 36-inch diameter for pipe lines, sewers, conduits, etc., under highways, railroads and embankments, without tunneling or tearing up the road bed. In operation, the boring machine is placed in the ditch and braced. It is driven by a gasoline power unit which is set up on one side of the ditch, power being transmitted through a flexible shaft and chain to the worm shaft of the boring machine.

On the front end of the pipe or casing being installed is a hard-faced hollow cutter head. The casing is flanged to the hollow driving spindle which is rotated and is forced forward by the lever jacks. The cuttings are removed by a spoon on a 1 1/4-inch pipe, or are washed out by water preferably from a

high pressure fire stream, when obtainable.

After the casing has entered the embankment about 6 feet, or when the rotating hollow spindle has advanced its full length, the flange of the driving head is unbolted from the casing and an 8-inch x 5 1/2-foot extension joint with flanged ends is inserted between the boring machine and the driving head of the bor-

ing machine. This cycle of operations is repeated until the casing has advanced 20 feet or more, depending on the length of the casings. All of the 8-inch x 5 1/2-foot flanged extension joints are then removed and another length of casing is welded or screwed onto the preceding joint. These operations are continued until the full length of casing is installed.

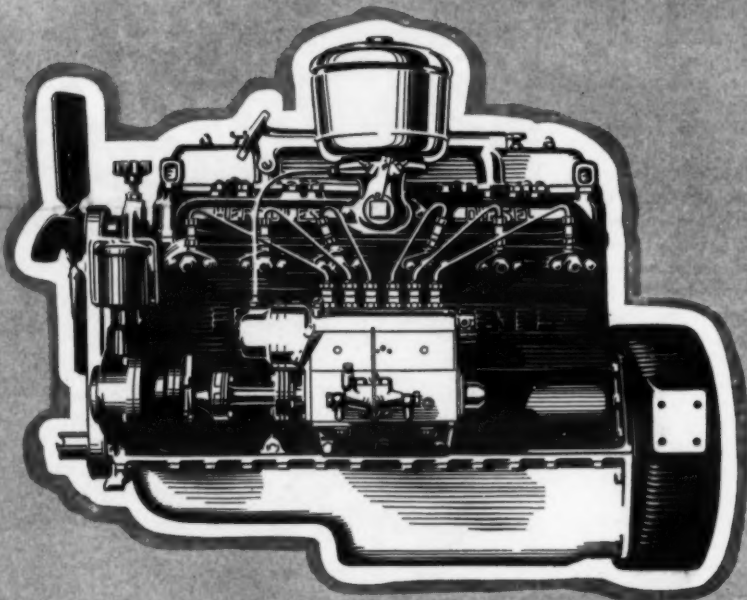
"MECHANICAL JOINTS"



FLEX-PLANE joints for crack control minimize major stresses, curling and blow-ups; produce stronger slabs; localize expansion and contraction; lay slab to slab with maximum load transfer. Premoulded, poured, asphaltic ribbon, steel ribbon, zinc ribbon and cork installed by FLEX-PLANE Method. Joint Installers, Finishing Machines, Expansion Joint and Dowel Rod Spotters Leased and Sold By

FLEXIBLE ROAD JOINT MACHINE COMPANY, WARREN, OHIO

HERCULES



ENGINES

The Hercules Motors Corporation presents the latest additions to its line of heavy-duty engines—two, small, six cylinder, high-speed Diesels, developing 79 H. P. and 82.5 H. P. at 2600 R. P. M. With the advent of these Series DJX compression ignition engines, Diesel economy now enters new and much broader fields.

Like the larger and more powerful DHXB

and DRXB Hercules Diesels, these small Diesels are characterized by clean, compact design, and remarkably complete combustion which means unusual performance ability. They are the smallest six cylinder, high-speed, heavy-duty Diesel engines built in the United States today and are interchangeable in mounting dimensions with the extensively used JX Series of Hercules gasoline engines.

HERCULES MOTORS CORPORATION, Canton, Ohio

America's Foremost Engine Manufacturer • Power Plants from 4 to 200 H. P.

See the Hercules Exhibit of Gasoline and Diesel Engines at the Road Show, Cleveland, Ohio, January 18th to 24th

Farm Ponds Built on a 1935 Project

Kansas Highway Commission Saves Water in Arid Area and Checks Erosion with Culverts High in Bank

By L. C. Brisbin

IN THE days of the big cattle drives and ox-drawn wagons, the trails of Kansas followed the lines of least resistance, usually along a ridge until a convenient pass was found to cross to the next ridge. Today, Kansas lays out her roads as straight as possible. In Rawlins County, an NRS project eliminates 7 miles on Route 36. The new location extends 8½ miles east of Atwood.

Projects NRS 510 A, B and C consist of earth work, culverts, and bridges. The earthwork comprises 658,757 cubic yards of unclassified excavation, including 11,220 cubic yards of rock. The soil is a fine powdery sand-clay that works very easily but requires moisture for compaction.

A standard 32-foot roadway with maximum 6 per cent grades is being built. The low fills have 3 on 1 shoulder slopes and the high fills 2 on 1 slopes with guard fence. The ditch slopes are 1½ on 1.

As this soil is readily eroded, wherever the land outside the roadway slopes toward the backslope, dikes are constructed at the top to prevent wash. These dikes carry surface run-off parallel to the road and then away to the nearest stream or gully.

The Farm Ponds

An important feature of this particular project is the construction of farm ponds in most of the canyons that are crossed. This is new practice and Rawlins is the first county in Kansas to have them. Wherever a project crosses a canyon or small stream and a culvert is required, instead of placing the culvert in the low point or in the stream bed, it is placed up on the bank. A berm is constructed on the shoulder slope to keep the water away from the fill and the water is ponded up to the flow line of the culvert.

Because of the sharp grades in these canyons, the ponded areas are not very large but as this is a territory of limited

rainfall, there is not very much water to impound. These ponds are also important as settling basins as they remove silt that would impair grazing areas in the valleys below.

The ponds call for several special designs in the culverts, with broken flow-lines, and in a few cases flume outlets with settling basins. Any structure of less than 20 feet in span is considered a culvert and is included in the earthwork contract. There are 22 culverts on these three projects, ranging from 3 x 3 to 12 x 12-foot in cross section.

Culverts of Two Types

The culverts are of two types, grade culverts and underfill culverts. The grade culverts are built with the slab 1 foot below the finished grade. The headwalls are 32 feet apart and have hand-rails. Underfill culverts are constructed under high fills, the length being determined by the height of the fill and the shoulder slopes. The culverts built to form the ponds were all of the underfill type.

Because of the irregular contour of the terrain, it was difficult to place the culvert footings on natural ground. To do this and have the outlet conform with the stream bed, it was often necessary to break the flow line. In two cases the fall was so great that it required a flume outlet. These flume outlets rest on a 2 to 1 slope and have a settling basin at the bottom. The basins prevent any scour at the outlet.

Within the city of Atwood, Kans., there is a double 8 x 4-foot culvert with curb inlets constructed in the slab. These inlets remove the water from the curb and gutter to the stream. They are open for the full span, making a 16-foot opening.

Curb and Gutter

In the section of this project within the city of Atwood, curb and gutter is required. There are two types of curb and gutter used: Type 1, standard 6-inch curb and 2½-foot gutter, and Type 2, laid back curb and short return for entrances and a 20-foot return and val-

ley gutter for street intersections. All fills are rolled and tamped to prevent any settlement of the curb and gutter and to provide a firm base.

Personnel

List & Clark Construction Co., Kansas City, Mo., was the contractor for this project with E. E. Clarkson as Superintendent. For the Kansas State Highway Commission, the work was in charge of W. D. Scully, Resident Engineer.

PERFORMANCE-ACCESSIBILITY



Forked River Yacht Basin

improved with

BETHLEHEM Steel Sheet PILING

AN interesting example of the use of Bethlehem Steel Sheet Piling is afforded by recently completed improvements authorized by the State Board of Commerce and Navigation in the yacht basin at Forked River, N. J.

Around a portion of this basin a bulkhead of Bethlehem Piling, supplemented by a wooden fender system, has been installed, adding decidedly to the attractiveness and utility of the shore line. Part of the land reclaimed is now occupied by service facilities. To accomplish these objectives required the use of only 59 tons of steel sheet piling.

Gray Construction Company, Morristown, N. J., Engineers and Contractors.

Reasons for the use of Bethlehem Steel Sheet Piling in this bulkhead at Forked River are the same as those which have led to its use in so many other projects: great strength, long life, low cost of installation, low expense for maintenance. Bethlehem Steel Sheet Piling is the strongest material available for the building of earth-retaining structures. It forms a wall with strong, sand-tight interlocks between the individual pieces. It is readily driven or jettied to depths that, when attained with other materials, involve difficulty and added cost. And it lasts for years, even in salt water.



The bulkhead of Bethlehem Steel Sheet Piling adds materially to the attractiveness of the shore line

KALMAN STEEL CORPORATION, Subsidiary of Bethlehem Steel Corporation. General Offices: Bethlehem, Pa. District Offices: Albany, Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Houston, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, San Antonio, St. Louis, St. Paul, Syracuse, Washington. Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Seattle, Los Angeles, Portland, Salt Lake City, Honolulu. Export Distributor: Bethlehem Steel Export Corporation, New York.



PORTABILITY



The ½ Yard **AMERICAN GOPHER SHOVEL** CRANE DRAGLINE can be easily loaded on a trailer and trucked to the job. It meets all weight requirements and road clearances.

When job is finished, just reload and truck to new job.

Here's real portability and economy of operation.



AMERICAN HOIST & DERRICK COMPANY
SAINT PAUL MINNESOTA

New Highways in Asia Replace Caravan Trails

(Continued from page 5)

drawn American road graders have been put into operation, while in Fukien Province light-weight tractors and graders have been purchased. The Peiping Municipal Government has been making good use of an American tractor and grading outfit in its area.

The opening of the Shanghai-Wusih highway, connecting these two important industrial cities, on Aug. 15, 1935, gives China's foremost trading metropolis its first direct highway route to the national capital at Nanking. Illustrative of some of the highway problems of China is the large amount of bridge construction necessary in the lower Yangtze River delta, owing to its network of canals. Within the 88-mile stretch lying between Shanghai and Wusih, 149 bridges and 53 culverts have been constructed.

Highway construction in China has been accomplished mainly by mass labor because of its abundance and cheapness. A few American tractors, road graders and rock drill air compressors, and some British and German steam and diesel road rollers, comprise the modern road building machinery which has been used, although it is believed that simple road maintenance machinery will become more popular in the future.

Japan's Roads Are Good

After a discussion of China and her progress, one's thoughts turn naturally to Japan, her small hustling neighbor. The contrast between almost every phase of the life and development in these two countries is marked, and Japan has far outstripped China in the development of her highway system, though it must be remembered that Japan has not faced the terrific problems of long distances, variations in climate and difficult terrain which has contributed to the slowness of development in China.

The most recent statistics on road mileage for Japan are of December, 1932, as secured from the Highway Bureau of the Department of Home Affairs.

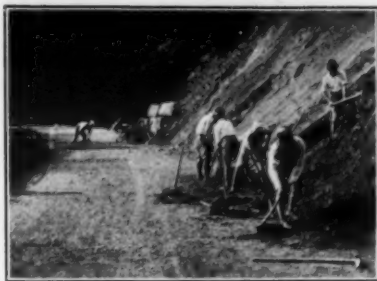
Classification of Road	Miles
National roads	5,197
Prefectural roads	65,499
Municipal roads and streets	23,029
Town and village roads and streets	500,901

Total594,626

National roads have a width of 24 feet or more; prefectural and municipal roads of not less than 18 feet, while town and village roads include all sorts of roads, streets, lanes, regardless of width. It is probable that all of the roads under the first three categories are practicable for motor traffic. It is roughly estimated that about 100,000 miles of roads in Japan are now suitable for motor traffic and that vehicles are operated over an additional 25,000 miles during the greater part of the year.

No information is available as to the types of surfaces included in the above total. Most of the national roads are fairly well surfaced and the principal ones are paved. A few of the roads constructed during the past three years are excellent modern motor highways and compare favorably with those in the United States. However, the great majority of the Japanese roads still have loose gravel surfaces. In the case of the national and prefectural roads, these are generally well graded and drained and kept in good repair throughout the year. A large number of these roads have been widened during recent years, steep grades and sharp curves eliminated, and modern bridges constructed.

The Government has undertaken a very extensive road building program as a measure of unemployment relief. This work started in 1931 and appropriations for the past three years have



Bureau of Foreign and Domestic Commerce Photo

Road Construction in the Mountains of Yamashina Prefecture, Japan

been: 1933, 63,000,000 yen; 1934, 89,000,000 yen; and 1935, 35,540,000 yen. In addition, as an emergency measure to repair the damage caused by the September 1934 typhoon, the sum of 75,060,000 yen has been appropriated for road construction in 33 prefectures. A portion of this has been used and the remainder will be used during the 1935-1936 fiscal year.

Other Countries

The Government of Chosen has recognized the importance of highway improvement and in 1931 a three-year program was adopted, in part for the re-

lief of unemployment. About two-thirds of the total for various public works, amounting to 27,673,000 yen (about \$13,836,500 at par), was allocated for highways.

In 1931-32, the latest year for which figures are available, the total length of roads in British India was 255,512 miles, of which 74,541 miles were metalled and the remaining 189,971 miles unmetalled. Most of the metalled roads are macadam. These roads are maintained partly by the Public Works Department of the Province concerned, partly by municipalities, and partly by

(Continued on page 25)



But My 6 'L-O's' Cut Costs and Increased Yardage "

— says William Lathers, Jr.

"I like my 6 'L-O's,'" says William Lathers, Jr. "Their performance on my La Crosse County (Wis.) job has convinced me they are A-1 tractors. They have cut my fuel costs and have increased my daily yardage because they have more power. Pulling 8-yard scrapers in the soft ground we have encountered on this job, is mighty tough work and an excellent test of tractor dependability. I made no mistake when I chose A-C Oil Tractors."

This is a conservative example of the way contractors praise the Allis-Chalmers Oil Tractor. "L-O's cut my costs in half"... "Best balanced tractor I ever used"... "Easier starting"... "Easier to maneuver"... are typical comments. All this points to one obvious conclusion—the most advanced design in tractor engines today is the A-C low compression Oil Engine ... in which Diesel fuel is injected into the combustion chamber with a Diesel pump and ignited with time-tried electrical ignition. The result is Diesel fuel economy with gasoline engine simplicity.



Six "L-O's" on the job of William Lathers, Jr. in La Crosse County, Wisconsin.

DIESEL FUEL

INJECTED WITH A DIESEL PUMP

IGNITED BY A SPARK

Gives you:

- EASIER STARTING
- SMOOTHER OPERATION
- LESS VIBRATION
- FEWER REPAIRS

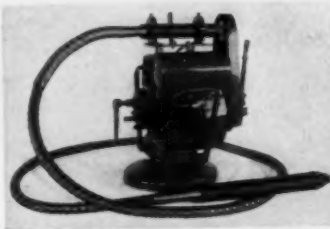
New Gas-Engine-Operated Concrete Vibrators

Two new models of gasoline-engine-operated concrete vibrators have been announced by the White Manufacturing Co., Elkhart, Ind. Model M-1 is a 23/8-inch diameter vibrator for small forms and Model M-2, with a 3 1/2-inch vibrator, is designed for larger jobs where a greater intensity of vibration is required.

A constant rate of pulsation of 3,800 to 4,000 vibrations per minute is assured by an engine governor. Lower

engine speed, of 2,500 rpm, to insure long engine life and low maintenance cost, is obtained through a V-belt speed change and ball-bearing belt-adjusting countershaft. A sturdy engine provides increased power by a larger bore and stroke. Timken bearing crankshafts and an automotive-type carburetor provide easy starting and fuel economy. All ball bearings are packed in grease.

Model M-1 has easy lifting handles and a swivel base; Model M-2 has a wheelbarrow mounting. Both models can be furnished with electric motors instead of gas engines if the purchaser so desires.



Model M-1 White Vibrator

Literature illustrating and giving complete specifications for both models may be secured from the White Mfg. Co. by mentioning this magazine.

Concrete Plant Speeds Work on Texas Bridge

(Continued from page 2)

down a slight slope to the platform where it was unloaded by two men, and emptied by another into the hopper of the Ransome 28-S mixer.

The tunnel conveyor delivered the material into a pit at the bottom of a Rex bucket elevator which carried the aggregate to the proper division of the bin over the Blaw-Knox batchers. A system of colored lights controlled the delivery of the proper aggregate as needed to keep the bins full, a red light for sand and green light for gravel.

Handling the Concrete

After mixing for 1 1/2 minutes the concrete was delivered to one of three bottom-dump buckets carried on flat bed trucks which hauled them from the mixing plant to the approximate location for placing, but at ground level. The buckets were swung onto the deck or over the pier by a Lorain 75 crane with a 70-foot boom. The crane ran across the stream on a temporary trestle which also made travel from one end of the job to the other much easier than going around to the old bridge which has served traffic for many years.

The bottom-dump buckets were always dumped into a hopper for pouring deck or arches. Only when pouring the piers were they dumped direct into the forms. In pouring the arches the pour was carefully divided to maintain a constant balance in the structure to prevent distortion of the centering and forms. The material from the hopper was delivered through two chutes one to either side, alternately about one yard of material at a time. For pouring sections requiring rehandling two-wheeled concrete buggies were used, there being three or four in use.

There were from 20 to 25 men in the concreting operations including the mixing and placing, with 3 men on the delivery hopper. The total labor organization was about 75 per shift. Skilled labor was worked regularly 30 hours a week on 10-hour shifts the last three and first three days of the week, then laid off a week. The amount of work for unskilled men, who were kept on a single operation as far as possible, was not sufficient to permit them to earn their full 30 hours so they were allowed to make up their time as helpers to carpenters, etc.

Quantities

Unclassified structural excavation.....	3,826 cubic yards
Solid rock excavation.....	1,180 cubic yards
Class A concrete, superstructure.....	4,497 cubic yards
Class A concrete, abutments and bents.....	478 cubic yards
Class A concrete, piers.....	3,399 cubic yards
Class B concrete, piers.....	351 cubic yards
Reinforcing steel.....	801,793 pounds
Structural steel, cylinders.....	75,100 pounds
Special railing, concrete.....	1,702 feet

Personnel

The Uvalde Construction Co. of Dallas, Texas, was the contractor for the Guadalupe River Bridge at New Braunfels, Texas. The project was located on State Highway 2 in Comal County and was known as NRM 66B. L. W. Boyd was Superintendent for the contractor on this project during the concreting operations. For the State Highway Department, D. G. McKim was Resident Engineer.

New Baltimore Manager for Gar Wood

Stephen R. Faatz, former Manager of the Los Angeles branch of Gar Wood Industries, has recently been transferred to the Baltimore, Md., branch where he will occupy the same position, succeeding George F. Head, resigned. John B. Work of the Los Angeles office will take over the former duties of Mr. Faatz on the west coast.

Going!

ALLIS-CHALMERS OIL TRACTORS

TRACTOR DIVISION—MILWAUKEE, U. S. A.



The Old Canal Days Will Return With the Widening of the Chesapeake-Delaware Canal to Take Ocean-Going Ships. A Scene on Burkett Construction Co.'s Part of the Job.

Progress on Ship Canal Linking Coastal Cities

Of vast importance to water-borne commerce and to military strategy in coast defense, the inland tips of Delaware and Chesapeake Bays are being linked by a new big-ship canal which will shorten the distance between Philadelphia and Baltimore by 286 miles.

The project is the deepening and widening of the old Chesapeake and Delaware Canal, connecting Elk River and Delaware City. The passage was dug in 1825, in the days when enthusiasm for inland water traffic first swept the eastern states. Now, under the direction of the War Department, this old artery is to be modernized into a sea avenue 250 feet wide and dredged to a 27-foot depth. The length, 14 miles, and the route will remain virtually unchanged. At present, the canal is 90 feet wide and 12 feet deep. The cost will be \$18,144,000, of which a first allotment of \$5,107,000 has already been made.

Contracts totaling 4,500,000 cubic yards of excavation were let in eight equal sections to three contractors: Edward H. Ellis, Inc., Westville, N.J., five sections; Burkett Construction Co., Philadelphia, two sections; and Richards-Kelly Construction Co., Philadelphia, one section.

Of the total excavation, 3,000,000 yards will be excavated in one 4-mile stretch of the canal. No locks will be necessary. The present bank cut at high tide is 9 feet above sea level. Construction plans will carry excavation down to 15 feet above sea level. In widening, the vertical cut will be 90 feet.

Excavation has just begun, with ten Caterpillar diesel Seventy-Five tractors, one Fifty and one Sixty-Five tractor, a diesel-powered shovel, eight 12-yard LeTourneau Carry-All scrapers and two bulldozers as the earth-moving fleet.

The work will be completed in one year. When finished, passenger, freight and naval vessels will have only a 94-mile trip between Philadelphia and Baltimore instead of the present 380-mile voyage, almost half of it in the open sea.

Efficiency and Safety Found in New Welders

The new Flexarc dc welder recently announced by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., embodies many improvements giving increased safety and efficiency. Equipped with a single-dial preset control with which the welding current can be set to the exact number of amperes, this welder maintains a constant arc in spite of speed changes of the driving motor caused by line fluctuations. Open circuit voltage, well below hazardous values, provides safety for the operator yet retains all the desirable arc characteristics usually associated with high open circuit voltage. The moment the arc is struck, the set adjusts itself immediately to the required preset value. The new set eliminates the use of

meters, exciter, rheostat, reactor, unnecessary pushbuttons, field discharge resistor, starter holding coil, and the conventional underframe. With the elimination of the exciter and its continual power consumption even when the welder is not operating, the no-load input to the machine over the entire range has been greatly reduced. Since welding machines actually weld only an average of 50 per cent of the time they operate, the no-load losses are a major consideration in all-day efficiency.

Exhibitors at Road Show

The American Road Builders' Association has reported that on November 1, the list of companies planning to exhibit at the A. R. B. A. Road Show to be held in Cleveland January 20-24 was as follows:

J. D. Adams Co.; Air Reduction Co.; Allis Chalmers Mfg. Co.; American Casting Co.; The American City Magazine; American Concrete Expansion Joint Co.; American Manganese Steel Co.; American Sealdro, Inc.; Anthony Co.; Armco Culvert Mfrs. Assn.; The Asphalt Institute; Athey Truss Wheel Co.; Austin-Western Road Machinery Co.

Baker Mfg. Co.; Barber Asphalt Co.; Barber-Greene Co.; The Barrett Co.; Bay City Shovels, Inc.; Bendix Products Corp.; Bendix-Westinghouse Air Brake Co.; Black & Decker Mfg. Co.; Blaw-Knox Co.; Broderick & Bascom Rope Co.; Brown Sheet Iron & Steel Co.; Buckeye Traction Ditcher Co.; Bucyrus-Erie Co.; Buda Co.; Buffalo-Springfield Roller Co.; Byers Machine Co.

The Calcium Chloride Assn.; Philip Carey Co.; J. I. Case Co.; Caterpillar Tractor Co.; Chain Belt Co.; Chevrolet Motor Co.; Chicago Pneumatic Tool Co.; Chicago Rawhide Mfg. Co.; Cleaver Brooks Co.; Cleveland Rock Drill Co.; Cleveland Tractor Co.; Commercial Shearing & Stamping Co.; The Concrete Surfacing Machinery Co.; Construction Machinery Co.; Continental Roll & Steel Foundry Co.; Contrac-

tors and Engineers Monthly; F. D. Cummer & Son Co.

D-A Lubricant Co., Inc.; Davey Compressor Co., Inc.; John Deere Co.; Dow Chemical Co.; Eaton Mfg. Co.; Electric Tamper & Equipment Co.; Electric Wheel Co.; Engineering News-Record; E. D. Etnyre & Co.; Euclid Road Machinery Co.; Evans Products Co.; Fairbanks-Morse & Co.; Foote Co., Inc.; Four Wheel Drive Auto Co.; Fuller Mfg. Co.

Galion Allsteel Body Co.; Galion Iron Works & Mfg. Co.; Gardner-Denver Co.; General Motors Truck Co.; Geneva Metal Wheel Co.; W. S. Godwin Co., Inc.; Gorman-Rupp Co.; Gruendler Crusher & Pulverizer Co.; Geo. Haiss Mfg. Co., Inc.; Harnischfeger Corp.; Heil Co.; Heltzel Steel Form & Iron Co.; Hercules Motors Corp.; Hercules Powder Co.; Hetherington & Berner, Inc.; Highway Steel Products Co.; Frank G. Hough Co.; Huber Mfg. Co.; Hug Co.; Hyatt Roller Bearing Co.

Ingersoll-Rand Co.; Insley Mfg. Co.; International Harvester Co. of America; Iowa Mfg. Co.; Jaeger Machine Co.; Johns-Manville; Kalman Steel Corp.; Killifer Mfg. Corp., Ltd.; Kinney Mfg. Co.; Koehring Co.; Koppers Products Co.; La Plant Choate Mfg. Co., Inc.; The Layson Corp.; LeRoi Co.; A. Leschen & Sons Rope Co.; R. G. Le Tourneau, Inc.; Lima Locomotive Works, Inc.; Littleford Brothers; Lufkin Rule Co.

Macasphalt Corp. of America; Medusa Portland Cement Co.; Michigan Power Shovel Co.; National Colortype Co.; National Paving Brick Assn.; Na-

tional Traffic Guard Co.; Northwest Engineering Co.; Novo Engine Co.; Ohio Oil Co.; Owen Bucket Co.; Pioneer Gravel Equipment Mfg. Co.; Pitt & Quarry; Pittsburgh Steel Co.; Portland Cement Assn.; Public Works; Ransome Concrete Machinery Co.; R. B. Equipment Co.; Reo Motor Car Co.; W. A. Riddell Co.; Roads & Streets.

St. Paul Hydraulic Hoist Co.; Sauerman Bros., Inc.; Schramm, Inc.; Scintilla Magneto Co., Inc.; Signal Service Corp.; Sinclair Refining Co., Asphalt Div. and Lubricating Div.; T. L. Smith Co.; Solvay Sales Corp.; Speeder Machinery Corp.; Spicer Mfg. Co.; Standard Oil Co. of Ohio; Sterling Machinery Corp.; Sullivan Machinery Co.; Thew Shovel Co.; Timken Roller Bearing Co.; Toncan Culvert Mfg. Assn.; Trackson Co.; Truscon Steel Co.; Tuthill Spring Co.; Twin Disc Clutch Co.; W. S. Tyler Co.

United American Bosch Corp.; United States Steel Corp. Subs.; Universal Crusher Co.; Walter Motor Truck Co., Inc.; Waukesha Motor Co.; Wej-Lock Co.; Wellman Engineering Co.; Wheeling Corrugating Co.; White Motor Co.; Wico Electric Co.; Willamette-Hyster Co.; Gar Wood Industries, Inc.

The following companies will also exhibit: Butler Bin Co.; Diamond Iron Works, Inc.; J. D. Farasey Mfg. Co.; Good Roads Machinery Co.; Hargrave Construction Co.; Klauer Mfg. Co.; MacWhyte Co.; Marion Steam Shovel Co.; Rome Grader & Machinery Co.; Universal Crane Co.; Universal Power Shovel Co.

JAEGER Adjustable SPREADER



SMOOTHLY SPREADS
STONE, MACADAM
AND BITUMINOUS—
1" TO 10" OF LOOSE
MATERIAL, 8 TO 11 FT.
WIDTHS.

Lays low cost roads, faster, smoother and with real savings.

JAEGER
BITUMINOUS PAVER
power-driven, adjustable
9 to 15 ft., does precision
job without forms. Write
for details.

The Jaeger Machine Co.
701 Dublin Ave., Columbus, Ohio

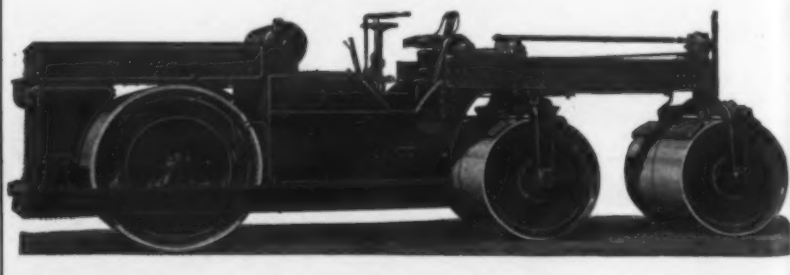
The NEW Buffalo-Springfield Three-Axle Rollers

For all kinds of precision rolling especially of bituminous materials either hot or cold

This new type of Roller (Patented) introduces the new principle of automatic compression and leveling, and retains the advantages of large diameter in all rolls. The entire roller is steerable with all rolls in permanent contact with the surface material thereby giving multiple compaction at all times.

A roller of this and other types will be exhibited at The Road Show in Cleveland, Jan. 20-24, 1936.

THE BUFFALO-SPRINGFIELD ROLLER CO.
SPRINGFIELD, OHIO



LANSING 3-1 MIXER



Large mixing drum, Hyatt roller bearing wheels, Wide-tread rubber wheels and spring shock-absorbers. Alemite fittings. Leeson 2 h.p. gasoline engine. WHITE—for specifications and current prices.

LANSING
COMPANY

LANSING, MICHIGAN
CHICAGO NEW YORK PHILADELPHIA
BOSTON KANSAS CITY MINNEAPOLIS
SAN FRANCISCO

Special Equipment Speeds Pouring of Concrete Sewer Pipe

By JOSEPH C. COYLE

A SIMPLE and effective means of pouring concrete, and of transporting it from mixer to forms, enabled the Torson Construction Co., of Phoenix, Arizona, to manufacture reinforced concrete pipe for the new Phoenix storm sewer without the necessity of using elaborate and expensive equipment.

Two 1-yard metal pouring hoppers, made by the Allison Steel Mfg. Co., of Phoenix, were mounted on top of a steel trestle which was bolted to the rear of the chassis of two Ford trucks. This gave the hoppers enough elevation to pour the concrete, through a metal spout, by gravity. Loading was achieved by backing the trucks into a pit at the Smith mixer. Being pivoted on the base, the hopper and spout may be turned in any direction for pouring into the forms.

Setting up the metal forms in rows across the yard, and using two small Buckeye cranes for handling forms and pipe, excellent time was made in manufacturing the pipe. The latter remained in the forms for 24 hours to set. The forms were then lifted off, using a two-band metal sling, and the pipe was covered with burlap and kept wet down with a hose for 7 days. The burlap was then removed and the pipe cured for 7 days more before being hauled to the job.

Reinforcing

All pipe 24-inch and over was reinforced. The steel reinforcing cages were also made by the Allison Steel Mfg. Co. Spacing bars cut to length were shipped from Los Angeles. Channels $\frac{1}{2}$ x $\frac{3}{4}$ -inch were used for reinforcing spacers in the larger pipe and $\frac{1}{8}$ x $\frac{3}{4}$ -inch flat bars in the smaller pipe. They were placed, 10 in a row, on a wooden bench, marked with measuring stick and soapstone, and then transferred to a Long punch press where the $\frac{1}{2}$ -inch fingers for gripping the spiral rod were punched. The curve in the bars, caused by punching, was then taken out by slapping them on a section of I beam. They were placed in bundles of fifty, for transportation to the pouring yard, where special jigs were set up for assembling the cages. These jigs consist of from four to six 2 x 2-inch angles, grouped about a central post of 2-inch pipe, at the top and bottom of which was welded a metal disc, the pipe projecting a few inches below the bottom disc and being slipped inside a larger pipe, which was welded to a section of steel beam, sunk in the ground. This was so that the jig could be lifted off the base with a block and tackle while rolls of reinforcing rod were placed about the base.

At the two ends of these vertical angles sections of the same material were welded horizontally, pointing in towards the central post, and each slotted for most of its length to take short bolts, inserted through holes in the metal discs, and used to adjust the diameter of the jig for different sizes of cage. The lower horizontal angles projected slightly outside the circle, and had a small slot in the flange into which the lower end of the spacing bar was inserted. The upper end of the spacing bar was held against the angle by a coiled spring and hook, of which there was one for each angle. The spacing bars were placed with fingers up, and the roll of rod was then brought

Torson Construction Co. Used Simple, Effective Methods on Sewer Job for Phoenix, Ariz.

up into place and the fingers bent around it, using hand hammers. At the bottom of each angle a metal shield, with rounded edge, was placed to prevent the coiled rod from hanging as it was lifted from the ground. The finished cages were given an elliptical shape in a light press, a careful check being kept on shape and size.

Sheets for the forms were $\frac{1}{8}$ -inch thick and reinforced at the ends with 1 x 2-inch channels, curved and welded to the exposed side of outer or inner forms. Handholds of rod were also welded to the exposed surface of the form sections and $\frac{1}{2}$ -inch angles were tack welded at the edges, with holes through the flange for keying them together with slotted pins and tapering keys. In making the forms the curve was started in a specially built air press and finished in a set of 5-foot rolls. The stiffeners were then welded on and the sections were planed on a Woodward-Powell planer, and then fitted by hand. Two Wilson portable welders, and a General Electric welder were used in the plant.

Preparing the Trench

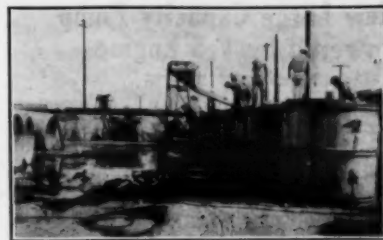
Work was started April 16th and about 2,000 linear feet of 54-inch pipe had been laid up to the end of July, using an Austin trencher for roughing out the trench and hand labor for leveling up for the pipe, which was handled to the trench with a Northwest dragline, equipped with a steel lifting hook, which was wrapped with 1-inch cotton rope to prevent breaking the corners of the concrete. Some shoring was used in the more unstable sections of the trench. The ditcher loaded into 3-yard dump trucks which hauled the waste for backfill, which was then leveled off with a Baker bulldozer mounted on an Allis-Chalmers tractor.

A Parsons trencher was also used as the job got into full swing. All trench 6 feet deep and under was dug by hand, giving employment to about 120 extra men. The deepest trench will be about 12 feet, with a maximum width of 7 feet. The sewer installation lies between 7th Street and 7th Avenue, south of Roosevelt. There will be 4 miles of 24-inch to 60-inch pipe and 10 miles of smaller pipe, down to 8 inches. Pipe under 24-inch is not reinforced, and is manufactured by the Arizona Concrete Co. The length of pipe used varies from $2\frac{1}{2}$ feet in the smaller sizes to 6 feet

in the largest pipe. Owing to the very flat terrain the grade of the sewer will be only from 1 to 0.4 percent.

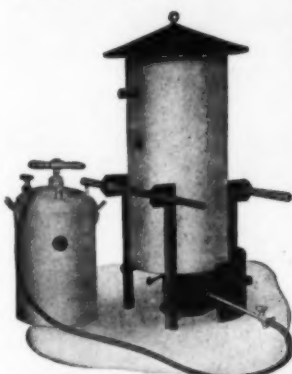
Personnel

The Torson Construction Co., which is made up of C. M. and T. M. Torson, was awarded this contract on a bid of \$277,000. Fred F. Kerns is General Superintendent of construction and L. L. Craig is Superintendent in charge of the yard. C. E. Griggs is City Engineer and A. F. Harter, Field Engineer.

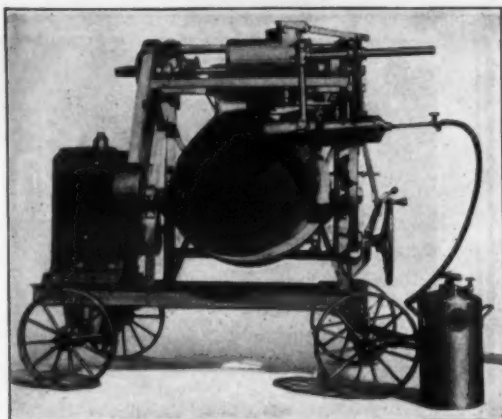


The Pouring Hopper Used by Torson Construction Co.

Prepare for Winter with Littleford Heating Equipment



Jacketed oil burning Water Heater that turns out a steady stream of hot water—ideal for outside construction jobs.



Littleford Concrete Heaters are made in styles and sizes for Mixers of all sizes and types.

You can carry on your various construction and maintenance projects with unabated energy if properly equipped with Littleford Heating Equipment.

Such outfits as Surface Heaters, Tool Heaters, Heating Torches, Concrete Heaters, Water Heaters and Salamanders enable you to have plenty of heat where you need it.

Write for complete information about Littleford Winter Heating Equipment. Let us tell you how and where to use it. You will be under no obligation.



LITTLEFORD

Road Maintenance Equipment
SINCE 1900

LITTLEFORD BROS. 485 E. PEARL ST. CINCINNATI, O.

PORTABLE ASPHALT PLANTS TOWER TYPE

LARGE CAPACITIES
HOT OR COLD MIX

Accurate control of materials to comply with any standard specifications for bituminous mixtures.

Send for Bulletin T-248

HETHERINGTON AND BERNER INC
Indianapolis, Indiana

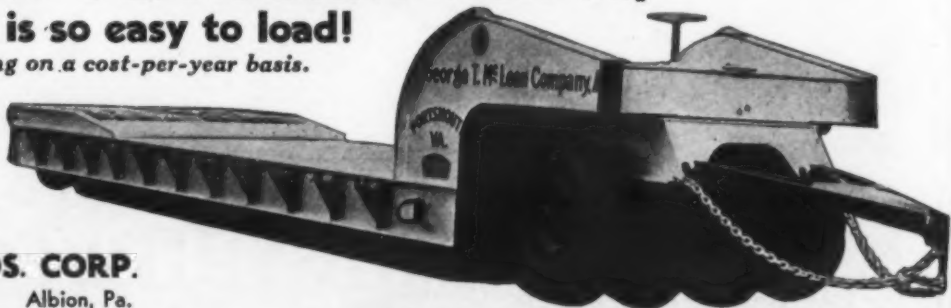
THE LOW PLATFORM—That's why a ROGERS is so easy to load!

Figure your hauling on a cost-per-year basis.

Then you'll know why the ROGERS gives satisfaction to so many contractors.

Sizes: 10 tons, 4-wheel, to
45 tons, 12-wheel.

ROGERS BROS. CORP.
108 Orchard St., Albion, Pa.



New Large Capacity Pump Powered by V-8 Engine

A new 6-inch pump, built for dewatering or jetting and capable of working on 28-foot suction lifts with air-tight suction lines or producing a fire stream for jetting or water supply service, has been announced by Ralph B. Carter Co., Hackensack, N.J., as an addition to the Humdinger line. The pump, which has a capacity of 96,000 gallons per hour, is powered with a conversion of the

Ford V-8 truck engine and is mounted on a rugged channel frame with four steel wheels.

The pump has full automatic priming, large air capacity for wellpoint work, no manually-operated valves, large clearances for the passage of solids, no complicated priming mechanism such as vacuum pumps, float chambers, clutches, chain drives, etc., and is built of abrasive resisting alloys with renewable wear plates.

Full information on this pump may be secured from Ralph B. Carter Co.

Hercules Body Taken Over by Specht

The Hercules body business has been taken over by G. K. Specht, manager of that division for the past several years, according to a recent announcement. Specht, who has been identified with the industry for many years, assumed control on November 1 and has made arrangements to operate under the name Hercules Body Co., continuing operations for the present in the same location at the West Franklin

Street, Evansville, Ind., plant where the body operations have been carried on for the past few years.

The line of Hercules truck bodies includes about fifty standard models for various makes of trucks as well as special bodies built for truck manufacturers. The standard bodies are sold nationally through distributors.

"Nearly every job in Russia is a Government Job," says a writer. Can it be that they have copied our form of government? —The Constructor

...For the World's Busiest Streets



STANOLIND CUT-BACK ASPHALT

More miles of Stanolind Cut-Back Asphalt road have been laid in the Middle West than any other kind, since the introduction of this type. A pure, high-grade paving Asphalt Cement, cut back with a special diluent. For asphaltic concrete (cold mix); for asphalt macadam (penetration method); for surface treatments in one, two or three applications; for re-tread or mixed-in-place surfaces; for maintenance and repair work. Proved remarkably effective on heavy traveled highways, including Michigan Boulevard, Chicago, one of the world's most heavily traveled streets. Outstanding qualities—non-skid surface, long life and comparatively low cost.

STANOLIND PAVING ASPHALT CEMENT

Used in sheet Asphalt pavement consisting of a wearing course made from a hot mixture of paving asphalt cement, mineral dust and sand; and a binder course consisting of a hot mixture of asphalt cement, sand and mineral aggregate—one of the oldest types of asphalt pavement. Also for hot mix asphaltic concrete and all types of pavement in which bituminous

or asphaltic cements are used. May be used over rough, uneven streets that have sufficient foundation strength for traffic requirements.

STANOLIND LIQUID ASPHALT

Sometimes called "road oil" and used to lay dust. Has been developed into an effective bonding material, manufactured to rigid specifications by Standard Oil Company (Indiana). Excellent for waterproofing ordinary earth, dirt, clay, or gumbo roads, and for base stabilization. Made in four grades—to fit all seasonal conditions, types of aggregate, methods of mixing—and is now being used on approximately 8,000 miles of road each year. Liquid Asphalt gravel mix makes an easy-riding road surface with splendid wearing quality. Costs less in first place and easy and economical to maintain.

Traffic requirements and the condition of present pavement will determine the best type of asphalt pavement to use, and Standard's representatives are always ready and glad to lend the help of their knowledge and experience in the selection of materials and methods for any particular job. Telephone your local Standard Oil (Indiana) office, or write.

STANDARD OIL COMPANY (Indiana)

910 South Michigan Avenue
CHICAGO, ILL.

There's Economy in Stanolind Asphalt Pavement for Every Traffic Requirement



Copr. 1935, Standard Oil Co.

ASPHALT FOR

ASPHALT *for every Purpose*

Work at Chas. Mill Dam of Muskingum Project

(Continued from page 1)

and gravel and then filled with large rock to insure drainage to prevent any wash from water percolating through the dam.

The embankment material was wet down as required for maximum compaction by a Ford sprinkler truck. The outfit described placed an average of 4,000 cubic yards of material in the embankment per 15-hour day. The contractor worked three 5-hour shifts and employed a total of from 100 to 150 men on the three shifts.

Gravel Plant

The contractor purchased all the sand and gravel for the concrete work on the spillway from W. P. McCarren of Walhonding, Ohio, who set up a Cedar Rapids portable plant about 1/2-mile from the spillway site. Material was pulled in from the pit by a Sauerman scraper run by a Flory 2-drum hoist with a Waukesha engine. The material was pulled onto an unusual grizzly. Instead of sloping upward as the scraper pulled the material forward it was sloped to one side so that it continually cleared itself of the large size stone. These were picked up by a man and loaded directly into a truck from the platform and disposed of at once. The grizzly was made of railroad rails spaced 9 inches apart.

Material passing the grizzly dropped into a hopper from which it was fed to an 18-inch belt 40 feet in length by a reciprocating apron feeder. The belt delivered the material to the 32-inch jaw crusher set to furnish 4-inch top size stone. A return feeder from the screens took the oversize back to the crusher. The first conveyor and the crusher were driven by a McCormick-Deering tractor.

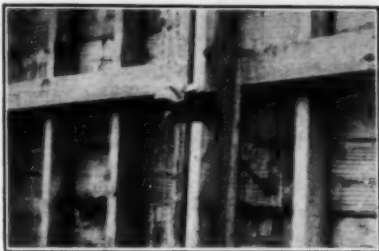
From the crusher the material was taken by another 18-inch belt 60 feet long to the washing screens and sand washer. These units were run by a LeRoi engine mounted on top of the screen structure. The gravel contractor experienced some trouble with loss of fine sand of which there was a dearth in the bank anyway. To overcome this he extended the sand settling tank so as to give a slower water velocity which conserved the fine sand. The screens delivered the material in four sizes of stone, 1/2, 1, 2, and 4-inch top size.

A 4-inch centrifugal pump powered by a Waukesha engine delivered water under pressure for washing the stone in the screens. A Barnes triplex pump with a Hercules motor was used for high pressure water to wash out the trucks, and the plant itself when shut down.

This plant, operated under the direction of W. C. McKee, Superintendent, ran three 5-hour shifts a day, producing between 400 and 500 yards of material a day. The screened stone and sand were trucked from the bins to stockpiles at the four corners of a pair of Johnson batching plants and was handled by the general contractor from the stockpiles to the bins with an Insley crane and a 3/4-yard Owen clamshell bucket. Six of the contractor's 2-batch trucks hauled the batched material from the plant to the Foote 27E paver which mixed all the concrete for the spillway. The five bags of cement were placed on the batches near the gravel plant and were opened by two men at a platform located convenient to the paver.

Concreting

Forms for the concrete retaining wall for the spillway were made up in panels 4 feet wide and 4, 6, 8 and 10 feet long with 1 x 8-inch lumber and 2 x 4's for framing. When set up 4 x 4-inch wales



C. & E. M. Photo

Detail of Forms for the Spillway Retaining Wall

were used with double 2 x 4-inch studs on the outside. The front forms were lined with plywood and the back forms used unlined. A special Williams form clamp was used because of the batter of the concrete faces. The standard clamp used on the outside of the forms turns up with a hand bar against a small cast plate with lugs to prevent turning. The plates used on this work were cast wedge shaped so that the pull on the tie rods could be taken up in line with the rods.

Water for the Foote paver was stored in a 3,000-gallon tank on the hill where the auxiliary spillway is located. A Barnes or C. H. & E. triplex pump supplied the tank.

The concrete from the paver to the forms was handled by a Bucyrus-Erie shovel rigged as a crane and using an Insley 1-yard concrete bucket. The crane was rigged with the digging line of the dragline outfit made fast to the crane hook so that the bucket could be pulled toward the machine, thus making it possible to handle the bucket close to the crawlers of the machine and so save shifting the crane many times during concreting. This contractor has used this scheme on many projects and has found it a real time saver. As all the concrete was placed dry it was vibrated with a pair of Jackson vibrators of the new type with the 2-inch diameter vibrating end units.

Personnel

The Muskingum Conservancy Project is in charge of Major J. D. Arthur, Jr.,

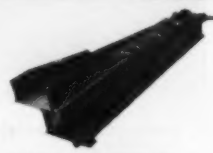
Corps of Engineers, U. S. A., as District Engineer, with Theodore T. Knapen as Chief of the Engineering Division. The Charles Mill Dam is in the Loudenville Area, J. M. Belknap, Area Engineer and N. G. Fasnacht, Resident Engineer. R. E. Ryan, Roy Ryan, and Ralph Myers of Ryan and Myers of Campbellsburg, Ind., managed the contract themselves, in addition to their engineers and superintendents on the concreting and earthwork respectively.

Get
**CLEAN
SAND
and
GRAVEL**
with

EAGLE WASHERS

Screw and Paddle type machines to meet particular washing and cleaning problems in sizes to suit capacity requirements. Send for bulletin W2 for complete information.

EAGLE IRON WORKS
DES MOINES, IOWA



THERE'S a lot more to power than engine ratings. The outstanding performance of modern Bucyrus-Eries is made possible by their plus-power factors...snappy response, minimum of friction losses, stability, control, strength, continuity of output. Look over a modern Bucyrus-Erie in action. You'll soon see how plus-power means plus-profits.

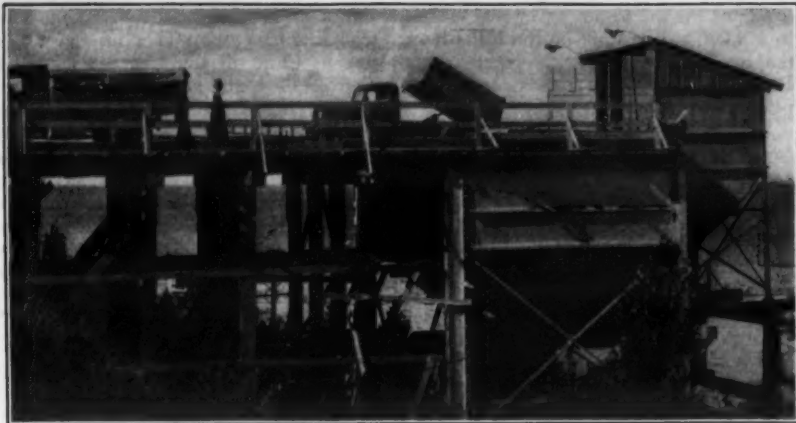
power



**BUCYRUS
ERIE**

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN



Delivering Materials to the Batcher Bins for the Construction of the Milwaukee Filtration Plant

Contractor Saves By Plant Set-Up

Road Equipment Adapted To Water Works Job a Boon to Kramp Con. Co. On Milwaukee Contract

ADAPTABILITY of cement and aggregate storage bins and batchers to suit the job and the landscape resulted in a substantial saving in the construction of a filtration plant for the water works of Milwaukee, Wis. Equipment which had been used on another project was brought into use under radically different working conditions, with plans so laid that all bin and batcher equipment could be continued in use on the water purification plant project.

The job, which it is expected will be finished early in 1936, calls for water reservoirs and coagulation basins and includes thirty-two filters and a clear well. The filters are 10 feet deep, 46 feet wide and 57 feet long, capable of filtering 200,000,000 gallons of water a day. The clear well, which underlies the filters and into which the filtered water will flow, is to be 18 feet deep and 300x400 feet, and will have a capacity of about 13,000,000 gallons.

The entire plant is being built on land wrested from Lake Michigan by means of a cofferdam. The location is at the base of a sharp lake bluff, several miles from a railroad, and could be reached only by trucks traveling through a residential section of the city, because of which special adaptations of equipment for handling bulk cement and aggregates had to be made by the contractor.

Set-Up of Bins and Batchers

Kramp Construction Co., of Milwaukee, contractor for the project, had used his Butler bin and batchers in the construction of the Jones Island sewage works at Milwaukee, with a bucket elevator set-up, and with cranes unloading cement and aggregates direct from railroad cars into the mixing and storage bins.

On the water purification plant project, it was possible to do away with the crane-lifting operations. The location of the plant at the base of a steep lake bluff suggested the construction of a ramp from the top of the bluff directly to the bins of the central mixing plant. Trucks backed onto a horizontal ramp and unloaded by gravity directly into the hoppers.

Crane operating costs of from \$65 to \$75 a day were eliminated by the side-hill construction. Because all material had to be hauled to the site by truck, there was a decided saving in locating the plant under the hill, as unloading operations did not require an extra handling. The crane which had been used at the Jones Island plant was

used at the railroad tracks to load the trucks.

Although the mixing plant was operated at capacity, the storage bins were ample for the required output per hour.

Handling Concrete

Bulk cement was brought to the job by truck, in 30-barrel loads. As the haul was through an exclusive residential section, and operations at the job required continuous hauling day and night, the Milwaukee City Council, after complaints about the noise by residents, required the contractor to erect a storage bin to hold sufficient material to take care of night work. A 450-barrel bulk cement storage plant was erected near the central mixing plant to comply with the city order.

Concrete was pumped from the central mixing plant to the forms by pipe line, the minimum pumpage being 300 feet and the maximum 1,500 feet. Seven-inch pipe was used and the Pumpcrete unit had a capacity of 24 to 50 yards an hour. Following the completion of each day's work, a "go-devil" was placed in the pipe line and a high pressure water pump turned on. This forced the mix from the pipes and left them ready for the next day's work.

Personnel

The construction of the Milwaukee purification plant is a PWA job, for which Kramp Construction Co., of Milwaukee is contractor. Dan Krause is Superintendent in charge for the contractor. Both the Milwaukee City Water Department and the U.S. Engineer Corps assisted in the plans and supervision of construction.



as Shovels
as Cranes
as Draglines

the "ALL AMERICAN LINE"
is an unbeatable combination
of seven, not eleven, as follows:
 $\frac{1}{2}$ $\frac{3}{4}$ 1 $1\frac{1}{4}$ $1\frac{1}{2}$ $1\frac{3}{4}$ Yd.
and 2 Yd. D. L.

AMERICAN HOIST & DERRICK COMPANY
ST. PAUL, MINNESOTA

New Lincoln Personnel and Officers Announced

A new office in Peoria, Ill., and another in Memphis, Tenn., have been announced by the Lincoln Electric Co., of Cleveland, Ohio. The Peoria office is located at 923 So. Washington St., and is under the direction of W. I. Miskoe. Mr. Miskoe has been promoted from the Chicago sales force to his new work as Manager of the Peoria territory under G. E. Tenney, Chicago District Manager.

The Memphis office will be under the direction of O. B. Farrell. Since Nov. 1, Paul M. Corp has been at the Milwaukee office, under the direction of George M. Johnson, District Manager.

Shifts in Byers Personnel

A. M. Byers Co., Pittsburgh, Pa., has announced the transfer of R. H. Gardner, formerly Division Manager of the Washington Office, to Pittsburgh as

Manager of Steel Pipe Sales. Simultaneously, E. L. MacWhorter, formerly Manager of the company's Philadelphia Division, moves to the Munsey Building in Washington, where he will head the combined activities of both divisions now known as the Washington Division. District representatives will be maintained, as in the past, in Baltimore and Philadelphia, the latter address now being 1212 Commercial Trust Bldg.

The Alexander Milburn Company

Standardized Cutting and Welding Apparatus, Paint Spray Equipment and Portable Carbide Lamps. Write for catalog.

1409 W. Baltimore St.
Baltimore, Md.



plus **CATERPILLAR** equals

Diesel Portable Performance at its **FINEST**

The COMPRESSOR is made by America's oldest and most experienced builder of vertical water-cooled compressors. It is water-cooled, of course, to give you uniform operating temperatures at all seasons . . . at least 50% cooler discharge temperature . . . lower lubricating oil consumption . . . better lubrication and less wear . . . higher pressure at the drill . . . longer life for air hose.

The DIESEL ENGINE is a "Caterpillar" . . . the most efficient internal combustion engine made . . . simple, dependable, successful at the hands of unskilled operators . . . idles at low speed . . . starts in zero weather . . . SAVES 60% to 75% of fuel costs.

Here's a Combination That Wins
Out Anywhere—In Any Weather!

GARDNER-DENVER COMPANY
Since 1859

102 Williamson Street

Quincy, Illinois



GARDNER-DENVER
MAKES AIR DO MORE AND COST LESS

R. R. Ties Chiseled Out on Ore. Repairing Job

(Continued from page 1)

of the skimmer and the latter was able to up-end the ties with a straight lift in spite of the great frictional resistance between the tie and concrete, which the specifications required must remain in place without being cracked, broken or otherwise disturbed.

Chiseling out the ends of the ties from top to bottom was a problem in itself. A special chisel was designed for use on a pavement breaker. Half a dozen shapes of blade were tried before one was found that would work down readily and at the same time loosen the chips so that they could be lifted out. One side of the blade finally adopted is flat and the other rounded so as to automatically pry off the chip. The chisel blade is slightly tapered, being $2\frac{3}{4}$ inches wide at the bit and $2\frac{1}{2}$ inches at the shoulder.

The chisel operators with their helpers followed behind the skimmer as it cleared the surface and removed the rails. When the ties were all chiseled out up to the skimmer, the latter was backed up a short distance, the boom swung to the rear and the ties up-ended, whereupon it returned once more to its operations ahead without unnecessary moving.

One chisel operator with one helper to clear the chips from the hole chiseled out a tie in from 5 to 10 minutes. As there were six Ingersoll-Rand pavement breakers on the job and a good supply of chisels made up, a sufficient number could be put on the chiseling job at one time to keep right up with the skimmer as it worked on the existing paving block removal.

New Diesel Tractors Have Greater Power

The Caterpillar Tractor Co., Peoria, Ill., has announced four new diesel tractors to be known as the RD-8, RD-7, RD-6, and RD-4, and a spark ignition machine called the Thirty. The first three diesel models succeeded the diesel Seventy-Five, diesel Fifty and diesel Forty and are comparable with them in everything except power. They achieve greatly increased power through an increase in cylinder bore from $5\frac{1}{4}$ to $5\frac{3}{4}$ inches and other refinements that have been made in the engine and fuel injection system.

As an example, the RD-4 consumes only $1\frac{1}{4}$ gallons of low-cost fuel oil in an hour. The old Thirty tractor burns about 4 gallons of gasoline per hour and its greatest speed is 3.6 miles per hour. The RD-4 and new Thirty have five speeds forward, the fifth being 5.4 mph. The standard tread is 44 inches and for wide gauge models the tread is 60 inches.

Picks and Shovels

(Continued from page 1)

Superintendent Steves found the electric crane man with his machine rocking crazily as he attempted to pick up a 35-ton lump of granite to load it on one of the huge trucks which hauled the rock from the quarry to the railroad flat car which delivered it to the job. The crane managed to set it down on the truck and somehow or other another crane managed to get it onto the flat car.

Several hours later the Superintendent for the breakwater called Steves on the telephone. "What's the big idea of sending us a stone that weighs 35 tons?" he is reported to have shouted, though we somehow feel that this may be an abridged and expurgated version of his remarks. "We can't get it off the car!"

Consequently the big stone was returned to the quarry, Powderman Wilson did a little block-holing, planted a few cartridges in various selected holes

and a little bag powder in others.

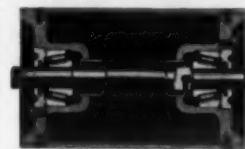
Boom! The 35-ton stone went back to the harbor as two stones, without being removed from the flat car.

Upham Becomes Consultant on Maryland Roads

Dr. H. E. Tabler, Chairman, Maryland State Roads Commission, has announced the appointment of Charles M. Upham, Engineer-Director of the American Road Builders' Association, as Consulting Engineer to the Maryland Commission. Mr. Upham has assumed this additional work and is engaging in a series of conferences with the Commission relative to the current highway program in Maryland which will utilize all available Federal and state funds on highway construction projects in the immediate future. This enlarged program will provide the foundation for making the state highway system adequate for Maryland's rapidly growing local traffic as well as the heavy travel

from the densely populated areas north and south.

Mr. Upham will continue as Engineer-Director of the A.R.B.A. with headquarters in Washington. The active engineering work of the Maryland State Roads Commission is directed by Nathan L. Smith, Chief Engineer.



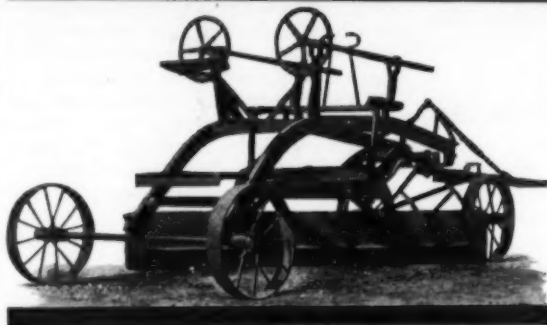
Adjustable bearings locked into pulleys take radial and thrust loads. Furnished with either Ball or Roller Bearings.

"CONWEIGH" Trougher No. 25

Conweigh presents an advanced design which provides the ultimate in economy performance and service. Write for new Catalog describing the complete Conweigh Line. Our line of Portable and Semi-Portable Conveying equipment is described in our Catalog of "Porta Conveyors."



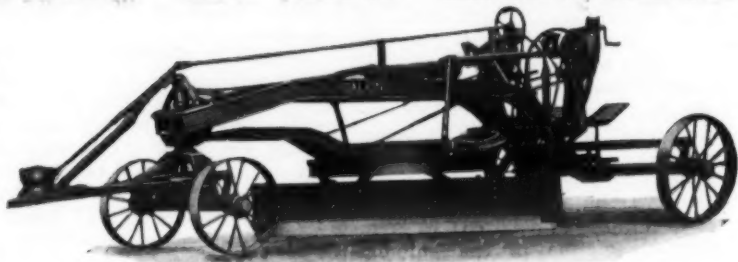
PORTABLE MACHINERY CO.
Division of A. B. Farquhar Co. Limited
BOX C-1, YORK, PA.



The Gallion "Pony" Grader (left) designed for light grading and maintenance work. It is exceptionally light but ruggedly constructed, and was designed especially for animal operation.

From the Smallest to the LARGEST

There is a Gallion Pull Type Grader of the exact size to meet any requirement you may have.



Gallion No. 110 Leaning Wheel Grader with Manual Operation

From the small "Pony" Grader, weighing in at 1,395 pounds (upper left) . . . to the big and heavy No. 14 Grader, weighing in at 14,000 pounds (below) . . . there is a Gallion Pull Type Grader of the exact size and weight to meet any requirement calling for this type of equipment.

Designed to meet the need for sturdy, light, general purpose machines, Gallion Straight Wheel Graders are strong and heavy enough for moderate ditching and grading work, yet light enough for general maintenance work. Their design embodies all the exclusive Gallion features found in the larger machines. Sizes of Gallion Straight Wheel Graders range in weight from 1,395 to 4,500 pounds.

The Gallion line of Leaning Wheel Graders provides a wide range of sizes (ten sizes ranging in blade lengths from 7 ft. to 14 ft.) to meet every grading requirement. All sizes are supplied with the famous Gallion E-Z Lift gearing which has won for them the reputation of being the easiest operating graders ever built.

Hydraulic Control is available on all the larger sizes of Gallion Leaning Wheel Graders using 9, 10, 12 and 14 foot moldboards. An efficient Scarifier can also be furnished for any Gallion Grader.

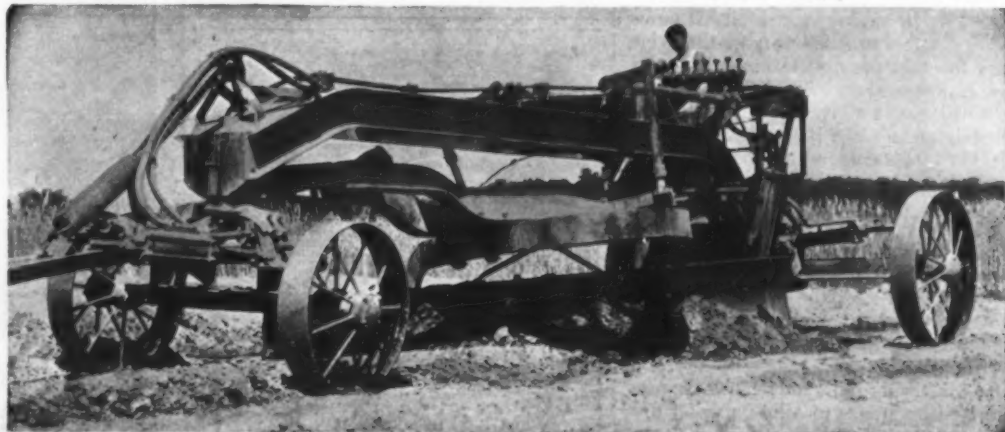
Write for complete information covering Gallion Pull Type Graders.

The Gallion Iron Works & Mfg. Co. Gallion Ohio

The heaviest Gallion Leaning Wheel Grader (right) is the No. 14, weighing approximately 14,000 lbs. Equipped with 14 ft. moldboard and Hydraulic Control. Can be furnished with manual control.

GALLION ROAD MACHINERY:

Motor Patrol Graders
Pull Type Graders
Road Rollers
Shoulder Maintainers
Patch Rollers
Spreaders
Rectors
Drags



NO SHUTDOWNS with a HOBART

The New Hobart Gas Engine Drive Arc Welder

No longer need broken equipment hold up your jobs—the Hobart 40-Volt Welder will let you handle repairs in short order—it is big enough to handle your steel construction work. Ask for your copy of "The Many Profitable Uses of Simplified Arc Welding." No obligation.

HOBART BROS.
Box CE-125
Tray, Ohio

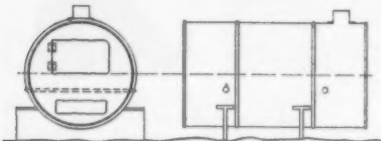
WRITE TODAY for FREE BOOKLET

How the Other Fellow Did It

Ideas Which Have Already Proved Helpful to Contractors

Steel Drums for Heaters

371 During the completion of a new museum of colonial architecture built with blue-stone walls last winter at Stony Point, N.Y., where General Anthony Wayne performed one of the escapades that won him the title, "Mad," the contractor used three horizontal, wood-burning heaters made of old steel drums. They needed heat so that the workmen could continue in the cold windy days and also to dry out interior plaster and cement work.



End and Side Views of Wood Burning Heater Made of Steel Drum

Rather than use coal-burning salamanders which would have filled the air with fumes, they devised, with the aid of a handy welder, three gas-tight heaters from steel drums, about 35 inches long and 25 inches in diameter. From one head a rectangular opening was cut and a sheet metal door on hinges devised. Immediately below this a smaller rectangular slot was cut for an ash door. At the opposite end and on top of the barrel, a circular opening was cut into which a section of flue pipe was welded.

As wood was the fuel used, some kind of a grate was necessary. This was made of two or three rods run through about one-third of the distance from the bottom of the barrel, which rested on its side, and not on the ends, the rods being welded in place.

A handy cradle to support the drum off the floor was made by cutting circular notches in T irons. The drums were set up about 10 feet from suitable openings where the flue could be run out so as to gain the additional heating area. The workmen reported "We were mighty comfortable in spite of the gales." But the life of the drums is not long.



C. & E. M. Photo
Giving an Edge Bar Its Asphalt Dip

Novel Method of Dipping Edge Bars for Road Slab

372 In many states it is now the practice to dip the edge bars for reinforcing the outer edges of the concrete slab. This was done in a novel manner by "Red" Williams, Superintendent for Russ Mitchell, Inc., of Houston, Texas, on a Brazoria County contract. With bars approximately 30 feet in length it is not easy to prepare a hot asphalt bath for the dipping. On this job the work was all done in a comparatively small space in the contractor's yard near the batching plant.

A pair of steel drums laid on their side were opened for the top third to permit placing the asphalt in one and sand for drying in the other. They were mounted on stones to allow a wood fire to be kept going underneath. The damp sand was shoveled into one and when

dried taken out for use in coating the dipped bars.

The other drum had a 1½-inch pipe run through the two heads, dipping in the center nearly to the bottom of the drum. A slot in the top of the pipe permitted the asphalt to reach the bars as they were threaded through the pipe. The entrance end of the pipe was beveled to make it easy to hit the opening and the exit end had a pipe reducer which snugly fitted the bars. This acted to spread the asphalt smoothly over the entire rod and remove some of the excess.

The rods were then run through a box of the dried sand with lips of metal at the entrance end so that the extra asphalt ran off into a bucket and could be poured back into the asphalt dipping drum. A negro laborer with that native showmanship grasped the end of the rod as it came out of the sand box and when the far end was free gave the rod one flip which was sufficient to whip it onto the pile of coated rods. Two men with this outfit coated a carload of rods in less than a day.

Fat Spots on Asphalt Roads Avoided by Ingenuity

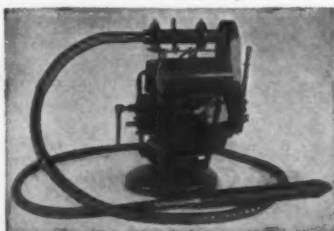
373 The problem of what to do with the first blow of asphalt from the nozzles of a distributor when applying asphalt and how to avoid the fat spots caused by the last material when the nozzle is closed is ever present on all bituminous road jobs.

M. J. Carroll, contractor of Ocala, Fla., devised a couple of ingenious schemes to solve this problem on a sand-clay and gravel base with asphalt surface treatment job in Georgia last summer.

Behind the distributor and below the spray nozzles the contractor placed a trough to catch the first blow from the nozzles when applying the asphalt. This trough was about 1 foot wide and 21 feet long and when used a strip of manila paper was spread across the length of the trough and covered with sand to make it possible easily to dispose of the wasted asphalt without having to cut it out of the trough. The paper was simply thrown to the shoulder and later gathered up and burned.

In blowing the truck at the end of a run, a half-round metal gutter, as used for the eaves of houses, with manila paper placed in it and covered with sand was used to catch the last material and run it out on to the shoulder instead of permitting it to get onto the road surface and cause a "fat" spot. 478:34

In 1925, the total of state funds diverted to purposes other than highway improvement exceeded \$14,000,000. In 1933, the practice had become so widespread that the states diverted more than \$124,000,000 that year, or about nine times the amount in 1925. This means fewer roads and inadequate maintenance.



Concrete VIBRATORS AND GRINDERS

Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART, INDIANA

Carbide Residue Used for Many Purposes

A waste product from oxy-acetylene welding, carbide residue, has real marketable value. Most contractors simply empty their portable generators at the nearest convenient point and are entirely satisfied with the service they have received from the carbide in an acetylene light or its use in combination with oxygen for welding.

The Linde Air Products Co., 30 E. 42nd St., New York City, has published a small 21-page booklet on the utility of carbide residue. Every contractor using oxy-acetylene generators should have one of these booklets just to know what he can do with the residue. It makes a good whitewash and formulae are given for interior and exterior weather-proof whitewash. It can be used in lime mortar for interior and exterior plasters, in concrete and stucco and it has many industrial uses such as improving the braking of hoist brakes.

A little carbide residue scattered on the floors of plants under bearings in engine pits and similar foundations soaks up oil and dirt. It is good for cleaning drainage pipes, it makes an excellent boiler lagging and unspent calcium carbide has come into quite common use for the quick thawing of ice which encumbers railroad frogs and switches, fire hydrants and similar equipment. Carbide residue also has a number of agricultural uses which may be of interest to contractors working outside of cities.

Know Your Hauling Costs

The large-capacity scraper-type of dirt moving unit which a few years ago reached prominence in the west is now used quite generally throughout the country. R. G. LeTourneau, Inc., Peoria, Ill., manufacturer of the Carryall scraper, has prepared two charts, the first of which gives the probable production and cost of earth moving when a 12-yard Carryall scraper is used and the second shows the grades over which the scraper or LeTourneau Buggies may be pulled, loaded and emptied by a Caterpillar Seventy-Five.

Contractors with dirt-moving problems on their hands should secure copies of these charts in order to be able to compare their dirt-moving costs either with this equipment or in comparison with their existing equipment. The charts were prepared by K. F. Park, a Civil Engineer, after intensive studies of a very large number of dirt moving operations with LeTourneau equipment.

Link-Belt Offices Move

The executive offices of the Link-Belt Co., for many years located at 910 So. Michigan Ave., Chicago, have been moved to the Bell Bldg., 307 No. Michigan Ave., where they will occupy the entire twenty-third floor and the north half of the twenty-first floor.

✓ CHECK THIS ONE!



A GOOD USED TRENCHER THAT WILL DIG A PROFIT ON ANY MAN'S JOB

Look at your investment in equipment from the angle of cost per yard. That's why this P & H Trencher is a standout among used equipment bargains of the year.

It's built for big production, but it can be profitably used on small jobs too. It's modern; 3 speeds on the bucket line give you the change of pace for all kinds of digging; power-operated spoil conveyor can be adjusted to any angle—shifted to either side; unit cast-steel frame and "Sure-Feel" power clutch protect main machinery from the jolts that would disable other machines.

It's practically new—we'll sell it with a factory guarantee. Write or wire us for details.

HARNISCHFEGGER CORPORATION
4419 W. National Ave. Milwaukee, Wis.

P & H TRENCHING MACHINES

QUALITY CONCRETE AT REDUCED COSTS

WITH

MALL CONCRETE VIBRATORS

Secure better bond between reinforcing steel and concrete and between successive layers of concrete. Finish surfaces earlier with a minimum of patching! Furnished with electric motor or gas engine power units with attachments for finishing, pumping, and drilling.

Bulletins on request

MALL TOOL COMPANY

7743 South Chicago Avenue CHICAGO, ILLINOIS

PRODUCTS OF EXPERIENCE



See Us
At
**CLEVELAND
ROAD SHOW**

January
20-24

Write for new bulletin on Wonder Tilting Mixers, Hoists, Pumps, Wheel Barrows, Master & Silverstreak Drum-Type Mixers, Saw Rigs, Plaster and Mortar Mixers, Concrete Carts.

CONSTRUCTION MACHINERY CO.

500 GLENWOOD STREET
WATERLOO, IOWA

New Highways in Asia Replace Caravan Trails

(Continued from page 16)

District and Local Boards. In addition to the work of the Provincial Governments, the Government of India since 1930 has set aside for road development the proceeds of a tax on motor spirit, which fund is administered under the advice of a Standing Committee for Roads.

The road system of the Straits Settlements, Federated and Unfederated States of British Malaya compares favorably with the best highways of the world. British Malaya has a higher percentage of motor vehicles for its population than any other country in Asia, there being one automobile for every 116 people.

In Netherland India, the Government spent about \$2,800,000 on highways in 1932. Since that time all Governmental expenditures have been slashed and highway appropriations very much reduced. The islands of Java and Madura are fairly well covered with roads, and northern Sumatra was to have been the center of most of the road construction, but the project has been set aside for the present.

Even in Afghanistan there has been an awakening to the desirability of developing roads and motor transport, as there are no railroads or waterways in the country. From meager reports it is learned that during 1932 and 1933 a road about 300 miles long was completed between Kabul to the Russian border which links up at Kabul with the 250-mile road between Kabul and Peshawar in northern India. American tractors and a few other units of road building machinery are now being used by the Government in constructing its new roads.

Iraq, the scene of the picturesque desert caravans, has a progressive highway plan of improvement, the budget appropriations for highway purposes in 1932-33 amounting to about \$325,000 from funds accruing to the Government from royalties paid by the petroleum companies. As the only railway in Iraq does not connect with any railway system outside the country, regular motor transport service is maintained with the adjoining countries. Overland freight and desert freight and passenger motor services are maintained between Baghdad, Syria and Palestine over unimproved desert trails. A movement is now on foot to construct a modern road along the Mosul pipe line to connect points on the Mediterranean coast with Iraq and Persia.

Syria under the French mandate has constructed a fair system of roads. Most of their recent work has been in the maintenance of existing roads and the construction of small sections of secondary roads. Adequate connections by road are maintained with Palestine and by one route over the desert to Iraq.

Persia, or Iran as it is now officially known, though handicapped by lack of funds, has made considerable progress during the past four years. Under an American Director General of Highways since 1930, many routes have been opened to traffic with other countries, over difficult mountain passes which are closed to traffic by snow during the winter months. As fast as routes are opened, motor transport is put into service, though such traffic still competes with the age-old camel and mule caravans. Approximately \$1,000,000 each year is being spent on highways.

Turkey, with 6,101 miles of unimproved roads and 7,088 miles, graded and drained only, without surfacing of any kind, out of a total of 23,223 miles, leaves great room for improvement. Many miles of its improved highways are still not serviceable during wet weather. The only source of revenue for highways is the road tax. Able-bodied males between 18 and 60 are liable to a road service of from 10 to 12 days work or a payment of from 8 to 10 Turkish pounds in lieu of actual personal services. There is no gasoline or oil tax and no revenue is derived from land or property taxes for road purposes. The government has not yet adopted the practice of issuing bonds for road construction.

The Philippine Islands, with only 2,158 miles of its 8,300 miles of highways unsurfaced, compares favorably with the United States and many other of the denser populated countries. This country's road system is an outstanding example of what can be accomplished in a tropical country by American trained engineers, a moderate supply of modern equipment, reasonably cheap labor and consistent regular appropriations from the income definitely earmarked for highway purposes. The construction and reconstruction of roads in the Philippines has done much to provide the Islands with an adequate transportation system and has opened up the markets of practically the entire territory to commerce.

A brief survey of the areas and road mileages of the countries in Asia, based on figures supplied by the Bureau of Foreign and Domestic Commerce, shows how much room there is for further development of the road systems in most of these countries.

Country	Area Square Miles	Road Area to Mileage 1 Mile of Road
Afghanistan	250,965	1,561 160.8
Arabia	1,000,000	1,055 947.9
British India	1,107,358	225,280 4.9
Ceylon	52,600	8,968 9.1
China (Inc. M. & Mon.)	4,300,000	17,062 1.5
Chosen (Korea)	85,227	51,056 84.2
Fr. Indo-China	284,900	15,435 5.5
Hong Kong	391	19,884 14.3
Iran (Persia)	628,000	377 1.0
Iraq	145,250	12,278 51.1
Japan	147,327	4,652 30.6
Macao	44	594,626 0.2
Netherland India	733,642	64 0.7
Pakistan	8,900	35,900 20.4
Philippine Is.	114,400	1,189 7.4
Siam	280,149	9,453 12.1
Syria	74,000	1,383 144.7
Taiwan (Formosa)	13,795	5,705 12.9
Timor (Portuguese)	13,648	9,750 1.4
Trans-Jordan	20,000	250 54.6
Turkey	294,492	569 35.1
Total	9,498,323	23,342 12.7
		1,006,579 9.2

A New Ripper-Excavator For Widening Roads

A new tool for use in road construction and particularly in widening projects has been announced by the Contractors Machinery Corp., Batavia, N. Y. This new Trojan excavator is a heavily built unit with a channel frame, steel wheels and three controls for the four scarifiers and the cutting blades, one of which is equipped for undercutting concrete slabs where a widening project is under way.

This tool can also be used for ditching, drainage and resurfacing, cutting underground electric cable trenches, excavation for conduits, gas, water, sewer, and pipe trenches. Pulled by a heavy tractor, this tool does all of the ex-

cavation itself. The three models available cut widths of 24 to 48 inches, depths up to 18 inches and are hauled by 30 or 65 tractors.

New Booklet on Conveyors

A new 16-page booklet, entitled "Pioneer Conveyors" describes and illustrates not only the standard Pioneer conveyors but also heavy-service conveyors with either plain or anti-frictional bearings; conveyor units; conveyor accessories; and simplified engineering data for laying out conveyors and conveyor installations.

Copies of this booklet may be secured from Pioneer Gravel Equipment Mfg. Co., 1515 Central Ave., N. E., Minneapolis, Minn., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

This is the unit that ETNYRE built

to improve an already remarkable line of bituminous distributors

1. *A more compact assembly* of pump, valves and circulating system reduces the weight about 300 pounds, permits the unit to be mounted 4 inches lower on the truck without reducing the road clearance of the spray bars, makes insulation easier, and allows the valves to be readily heated from the motor exhaust.
2. *The new leakless valves* eliminate the drip-drip which has up till now been so annoying to operators.
3. *The new fifth-wheel-driven tachometer* is proving more accurate and satisfactory than either front-wheel or transmission drive. The fifth wheel is raised, when the truck is on the way to or from a job.

504—Write just this number—504, on a post-card with your name and address, and we shall be glad to send you a copy of our Bulletin No. 504 which will give you further interesting facts concerning this new ETNYRE.



E. D. ETNYRE & CO.

DEALERS IN ALL PRINCIPAL CITIES

400 JEFFERSON ST.,

OREGON, ILL.



MODEL FO2

Bulletins and Pamphlets

For free distribution to contractors, engineers and officials. Write for the catalogs you need.

Fast Dirt Moving

540 Continental wagon scrapers, which are modern scoop-up and carry-away units in 5 and 7-yard sizes, designed for fast and profitable dirt moving, are described in literature which the Continental Roll & Steel Foundry Co., Industrial Equipment Div., 332 So. Michigan Ave., Chicago, Ill., will be pleased to send on request.

Diesel-Generated Power

541 Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill., will be glad to send to those interested complete information on the F-M Model 36 diesel-engine generator unit for furnishing power for a variety of construction jobs.

Asphalts and Road Oils

542 Specifications and other data for Standard asphalts and road oils, joint fillers, waterproofing and other asphalt products may be secured by interested contractors and engineers from the Standard Oil of New York Division, Socony-Vacuum Oil Co., 26 Broadway, New York City.

New 2-Inch Self-Priming Centrifugals

543 Bulletin 15 describing the new Marlow 2-inch self-priming centrifugal pump, mounted on two wheels for easy portability, may be secured by interested contractors from Marlow Pumps, Ridgewood, N. J.

1936 Trucks and Commercial Cars

544 Complete information on the improvements in the 1936 Ford trucks and commercial cars may be secured by contractors and highway officials from the Ford Motor Co., Dearborn, Mich.

Welding Electrodes and Accessories

545 Lincoln Electric Co., Cleveland, Ohio, has recently issued a new bulletin on its line of arc welding electrodes and accessories, copies of which may be secured direct from that company.

Hydraulic Control for Road Machinery

546 Complete information on the Austin-Western hydraulic control for graders, earth moving and road building equipment, which is designed to give positive, instant and accurate response, may be secured from the Austin-Western Road Machinery Co., Aurora, Ill.

Rugged Power for Heavy Work

547 Cummins Engine Co., Columbus, Ind., will be glad to send Bulletin QA-273 on its line of Cummins diesel engines for all kinds of heavy-duty service.

Complete Line of Pile Hammers

548 Descriptive catalogs on McKiernan-Terry pile hammers and extractors, as well as on its hoisting and derrick equipment, may be secured from McKiernan-Terry Corp., 19 Park Row, New York City.

New Bulletin on Welding

549 A new 24-page bulletin covering the complete line of P & H-Hanson arc welders from 50 to 800-ampere units as well as welding fixtures and accessories may be secured by those interested from the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis. Ask for Bulletin HW-4, "Weld It Well."

Special Features of Excavators

550 Link-Belt Co., 300 W. Pershing Road, Chicago, Ill., will be glad to send to interested contractors complete information on the special features of Link-Belt excavators, which are made in $\frac{1}{4}$ to 3-yard capacities, with gas engine, diesel or electric motor drive.

Cutting and Welding Apparatus

551 The complete line of Milburn cutting and welding apparatus for all types of light and heavy work is described in literature which the Alexander Milburn Co., 1409 W. Baltimore St., Baltimore, Md., will be glad to send on request.

Saving on Joint Installation

552 Flexible Road Joint Machine Co., Warren, Ohio, will be glad to send on request complete information on the Flex-Plane machine for installing expansion joints in concrete pavement and how the use of this machine can bring savings in this phase of road work.

Tracks for Pneumatic-Tired Equipment

553 Euclid tire tracks which were designed for use on the dual rear pneumatic tires of the Euclid Trac-Truk to increase the traction area for each rear wheel and which are adaptable to other units with the same size tires, are described in literature which Euclid Road Machinery Co., Cleveland, Ohio, will be glad to send on request.

New Grader Has Greater Visibility

554 The new-type Adams graders offer as one of several features complete visibility of the blade so that the operator can see just what he is doing. Complete information on this and the other features of these 12 and 10-foot blade machines may be secured from J. D. Adams Co., Indianapolis, Ind.

The Use of Belt Conveyors

555 A 112-page catalog, No. 610, has recently been issued by the Jeffrey Mfg. Co., 949-99 No. Fourth St., Columbus, Ohio, not only describing the complete line of Jeffrey standardized conveyors and accessories, but also depicting many uses in varied industries, giving examples showing how to determine the proper belt conveyor for any service and complete specifications. Copies of this catalog may be secured by readers of CONTRACTORS AND ENGINEERS MONTHLY on request.

Low Maintenance Costs for Streets

556 Actual cases and costs of the maintenance of Texaco asphalt paving on roads and streets may be secured by interested engineers from the Texas Co., Asphalt Sales Dept., 135 E. 42nd St., New York City, which will also be glad to send complete data on the many uses of Texaco asphalt products.

New 1936 Trucks

557 Complete information on 1936 Chevrolet trucks, features of which are ruggedness, power, modern appearance and low price, may be secured by contractors and engineers from the Chevrolet Motor Co., Detroit, Mich.

Complete Line of Pumps

558 Jaeger Sure-Prime centrifugal pumps, in 2, 3, 4, 6 and 8-inch sizes, 10,000 to 135,000 gallons, are described in literature which Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio will be glad to send on request.

New Catalog on Electric Tools

559 Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill., will be glad to send on request copies of its new catalog No. 32, describing and illustrating the entire Thor line of universal electric tools.

Cut your cost of wire rope trouble

by using

PURPLE STRAND

The strongest, most satisfactory Wire Rope that can be produced.

Purple Strand—built to handle the toughest jobs—has proven its right to leadership and its stamina has won an enviable reputation for long, dependable service.

Let us quote you on your next replacement.

Our new CATALOG will soon be off the press—a limited edition—Reserve your copy now!

WILLIAMSPORT WIRE ROPE CO.

Main Office and Works:
WILLIAMSPORT, PENNA.

Branch Sales Offices:
122 S. MICHIGAN AVE., CHICAGO

SEND THIS BACK—WE'LL DO THE REST
CONTRACTORS and ENGINEERS MONTHLY
410 FOURTH AVE., NEW YORK

Please send me the following literature, without cost or obligation

(Indicate by numbers)

Name _____

Firm _____

Street _____

City _____

P.S. Also send me catalogs and prices on _____



The New Adams Portable Welder

New Engine-Driven Welder for Use in Highway Field

The new portable engine-driven arc welding machine, recently announced by the J. D. Adams Co., is designed for adoption by the highway field for the repair of all kinds of machinery, for work on bridges, and for building up special structures and equipment.

The Adams arc welder is mounted on steel skids, requiring little space in the shop during the winter "machinery overhauling" season and being easily portable by truck or mounted on a steel trailer for field use.

One of the features of this new unit is a remote control switch in the electrode holder which enables the operator to start and stop the engine at will, though his machine may be located several hundred feet away from where the operator is working.

Complete information on this welding machine may be secured by readers of this magazine direct from J. D. Adams Co., Welding Division, Indianapolis, Ind.

Highway Guard Rail Guides As It Guards

Tyton highway guard rail, which is claimed to guide as it guards, is made of materials selected for their strength and long life, is easily and economically installed and maintained, and offers the required protection for motorist.

Posts of the conventional type of wood, concrete or metal may be used, lined up in the usual way and then

drilled to take the spring bolts. Heavy leaf springs of carbon steel, mounted on the posts, support the panels. The end of one panel is telescoped over the end of the next panel, twelve husky carriage bolts at each panel connection providing ample strength. The front of the panel, which is at bumper height, provides a smooth surface to guide the vehicle along the guard until control of the car is regained.

Tyton highway guard can be built to any length and to conform to any road. The panels are in 16-foot lengths, of special carbon steel. The rolled edges of the panels are designed to provide added strength and stability, reduce the tendency to twist and buckle when hit, and eliminate sharp dangerous cutting edges. The spring mountings increase the resiliency of the guard and provide clearance between the posts and the face of the panel, keeping the vehicle away from the posts.

Complete information on the Tyton guard rail may be secured from the Western Cataphote Co., Toledo, Ohio.

Dump Body Manufacturer Changes Corporate Name

The Marion Steel Body Co., Marion, Ohio, manufacturer of steel dump, garbage collection and commercial bodies for motor trucks, has announced the change of its corporate name to The Marion Metal Products Co. The offices and management remain the same, the

change being made solely to identify the firm more closely with the various products now manufactured.

"The Egyptians built the Pyramids without explosives. We could build our structures in the same way, but the cost would eliminate its economic justification and no one of the present generation would live to see them completed."—The Explosives Engineer



Get our catalog and prices on 100% automatic "Sure Prime" Pumps

JAEGER "HANDY" PUMP

LOWEST PRICED
8,500 GALLON
PUMP BUILT

100% automatic priming
—2½ H.P.—castings 20%
steel — compact, light
weight, rugged. Other
sizes to 135,000 G.P.H.

The Jaeger Machine Co.
701 Dublin Ave., Columbus, O.



12-YARD CARRYALL hauling down a steep grade onto the fill at Calero Dam.

ON THE DAMS AT SAN JOSE 75 LE TOURNEAU UNITS

In fruitful, orchard-growing Santa Clara Valley around San Jose, California, nearly 3,000,000 cubic yards of earth are going into six dams to conserve and raise the water table for irrigating purposes. The bulk of that yardage is being handled by LE TOURNEAU equipment—more than seventy-five units including CARRYALL SCRAPERS, BULLDOZERS, ANGLEDZERS, ROOTERS, SHEEP'S FOOT ROLLERS, BUGGIES and POWER CONTROL UNITS. The contractors on these dams chose LE TOURNEAU equipment because they knew its low cost performance would bring them profits. Typical of the performance there are these figures from Stevens Creek Dam—

750 Feet—79 Yards Per Hour

Average time for seven 12-YARD CARRYALLS hauling rooted material from a borrow pit on a 750-foot one-way haul was 6.08 minutes per round trip. At eight pay yards per load that's seventy-nine cubic yards per hour.

Ask our Engineering Department what LE TOURNEAU equipment can do on your job.

R. G. LE TOURNEAU, INC.

PEORIA, ILLINOIS STOCKTON, CALIFORNIA

Cable Address: "Bobleturno"

MANUFACTURERS OF: ANGLEDZERS, BULLDOZERS, CRANES, BUGGIES, CARRYALL SCRAPERS, ROOTERS, POWER CONTROL UNITS, SHEEP'S FOOT ROLLERS.

LETOURNEAU

Unusual Opportunity for experienced man in Crane-Shovel-Dragline Sales Work

LONG established manufacturer is seeking the right man to eventually head an important and responsible position.

Only those having experienced managerial and sales promotional ability will be considered.

Correspondence confidential.

Address Box 190
Contractors and Engineers Monthly
1719 Daily News Bldg.,
Chicago, Ill.

DIESEL DRAGLINES

4 30-B Bucyrus Erie Diesel Draglines, 50-ft. boom, 10-ft. extension, Atlas engine, caterpillar mounting.

2 775 P & H Diesel Draglines, 50 ft. boom, Atlas engine, caterpillar mounting.

The above are part of the surplus construction equipment of the Middle Rio Grande Conservancy District. Write or write for list of all equipment, which includes pumps, compressors, lighting plants, tractors, shovels, pile driving outfits, concrete mixers, scales, hoist control plants, outfit, concrete heaters and vibrators, sand screening plant, compressed air drill sharpeners, shop equipment, gasoline powered hoists with and without ships, bar benders and cutters, cable floodlights, and other items at bargain prices.

R. L. HARRISON CO., INC.,
ALBUQUERQUE, NEW MEXICO

ROCK DRILL BARGAINS

100 used CPIOW Chicago-Pneumatic Jackhammers in first-class working condition. Records of actual test alongside new drills show 75% efficiency. Exceptional values.

The J. C. McClintock Company
El Paso, Texas

TURNER SUPPLY COMPANY
N. W. Corner of St. Louis and Commerce Sts.
MOBILE ALABAMA

Representing

McKERNAN-TERRY Corp.—File Hammer
INDEPENDENT PNEUMATIC TOOL CO.—"The" Air and Electric Tool
WILLIAMS—Clamshell and Dragline Buckets
AMERICAN STEEL & WIRE CO.—"Monitor" Wire Rope
DOMESTIC—Pumps and Hoists
M & M Form Clamps
WYOMING—Red Edge Shovels, Scoops

LINK-BELT CO.—Crawler Cranes, Shovels, Loaders
WESTERN WHEEL SCRAPER CO.—Wheelers, Drags, Scrapers, Fronts, Ploughs
BATES—Bar Tie
JAEGER—Concrete Mixers
Paving Equip., Chuting Equip.
BEEBE BROS.—Hoists and Saws
LE ROI COMPANY—Air Compressors, Gasoline Heaters

ARIZONA TRACTOR & EQUIP. CO.
138 So. First Ave. Phoenix, Ariz.

"CATERPILLAR" Tractors
"CATERPILLAR" Road Machinery
ATECO Dismovers, Bulldozers, Tamping Rollers and Scarifiers
ATHEY Truss Wheels
BUFFALO-SPRINGFIELD Rollers
CLEVELAND Rock Drills
DAY Crushers

KILLEFER Road Tools
LAPLANT-CHOATE Snow Plows
LITTLEFORD Asphalt Equipment
EUCLID Earth-Moving Equipment
SCHRAMM Compressors
SMITH Mixers
BUCHVUS-ERIE Shovels

WILLAMETTE-HYSTER Hoists
Member: Associated Equipment Distributors

NEIL B. MCGINNIS CO.
1401 S. Center St. Box 1615 Phoenix, Ariz.

Representing

Adams Leaning-Wheel Graders
Allis-Chalmers Tractors
Barber-Greene Conveyors, and Loaders
Brennels Rippers & Scarifiers
Madsen Portable Paving Plants
Bully Back Fillers & Bulldozers
Erie Road Rollers
F.W.D. Trucks
General Shovels, Cranes
Gardner-Denver Portable Compressors, Jack Hammer, etc.
Gorrie Spreaders

Huber Road Rollers
Jaeger Concrete Mixers, Pavers, Pumps, Hoists
Jumbo Wheel Scrapers
Le Tourneau Heavy Grading Equipment
Madison Portable Paving Plants
Master Rotary Scrapers
Milwaukee Gas Locomotives
Morton Dirt Movers
Northwest Shovels, Cranes
Pioneer Crushing, Screening and Loading Plants
Snow King Rotary Snow Plows

RONSTADT HARDWARE & MACHINERY CO.
"Pioneers in Good Merchandising"

TUCSON ARIZONA

BROOKVILLE Locomotives
BAY CITY Shovels
GALION Graders and Rollers
McCORMICK-DEER-ING Industrial and Crawler Tractors
McCORMICK-DEER-ING Diesel and Gas Power Units
STERLING Hoists

STERLING Portable Pumps
POMONA Turbine Pumps
MYERS Pumps
KIMBALL-KROGH Centrifugal Pumps
REX Concrete Mixers and Pumps
TOLEDO Road Trucks

GARFIELD & CO.
Hearst Building San Francisco

Representing

PLYMOUTH Locomotives
LINK-BELT Shovels
Bay City Shovels
INDUSTRIAL BROWN HOIST
AUSTIN
MUNDY
LEACH
WORTHINGTON

CROOK COMPANY
2900 Santa Fe Ave. Los Angeles, Cal.

Southern California Distributors for

Allis-Chalmers —Tractors
Brennels —Discs, Rippers, Chisels
Bucyrus-Erie —Shovels, Cranes, Draglines
Buffalo-Springfield —Rollers
D-A —Lubricants
Holtzel —Steel Forms
Hutchins —Buckfillers, Bulldozers
Mack Weldbridge —Bulldozers, Scrapers
Sullivan —Air Compressors, Drills, Sharpeners
T. L. Smith —Concrete Mixers

Member: Associated Equipment Distributors

GARLINGHOUSE BROS.
2416 E. 16th St. Los Angeles, Calif.

Southern California Distributors for

RANSOME—Concrete Mixers, Pavers, Pneu. Floors, Grouters, Concrete Paving Equipment, Steel Forms
WORTHINGTON—Portable Compressors, Pneumatic Tools, Jackhammers, Pumps, etc.
DOMESTIC—Constructors Pumps
BROWNING—Truck Cranes, Shovels, Locomotive Cranes
BYER—Crawler Shovels and Cranes
OWEN—Clamshell Buckets
OMAHA—Clamshell Buckets
WHITCOMB—Gasoline, Diesel, Electric Locomotives
A. LESCHEN & SONS—Wire Rope
McKERNAN-TERRY CORP.—Pile Hammers
LAMBERT-NATIONAL—Hoists and Cableways
DIAMOND IRON WORKS—Crushers and Portable Gravel Plants

Member: Associated Equipment Distributors

SHEPHERD TRACTOR & EQUIP. CO.
150 W. Jefferson St. Los Angeles, Calif.

Distributors for

CATERPILLAR—Tractors, Graders and Diesel Power Units
LE TOURNEAU—Carroll Scrapers, Angle Dozers, Bull Dozers, Rosters, 25-Yd. Wagons
WILLAMETTE—Hoists and Winches
KILLEFER—Scrapers, Road Discs and Rosters
DAVEY—Air Compressors
ATHEY—Track Wagons and Truss Wheels

SMITH BOOTH USHER CO.
2001 Santa Fe Ave. Los Angeles, Calif.

BARBER-GREENE—Ditchers, Excavators, Loaders
CEDAR RAPIDS—Crushers
CLEVELAND—Crawler
CLEVELAND—Rock Drills
CLYDE—Hoists
EASTON—Industrial Cars
FREEMAN—Turntables
GALION—Graders, Rollers
HUGH-UNIVERSAL—Sweepers
HYPERBURST JENNY—Cleaners
JAEGER—Mixers, Hoists, Pumps, Power Equipment
JEFFREY—Locomotives, etc.
JOHNSON—Bins, Batches
WHEELED Rollers

LAKEWOOD—Road Finishers, Forms, Chuting, etc.
LIMA—Power Shovels, Draglines, Cranes
LITTLEFORD —Asphalt
MAWHYTE—Wire Rope
MULTIFOOTE—Pavers
NORTH STAR—Snow Plows
SAUERMAN—Cableway Excavators, Drag Scrapers
SCHRAMM—Compressors
TOLEDO—Trenches
WALTER—Wheel Drive
WAUKESHA—Engines
WILLET—Street Sweepers
WINSLOW—Truck Scales
WHEELED Rollers

Member: Associated Equipment Distributors

EDWARD R. BACON CO.
Folsom at 17th St. San Francisco

Adams Black Top Pavers
Brennel Excavators
Burch Spreaders
Byers Shovels, Cranes
CLEVELAND Rock Drills
CLEVELAND Trenchers
Dobbie Derricks
Erie Tandem Rollers
Freeman Turntables
Hutchins Power Units
Hyperburst Jenny Cleaners
Hugh Sweepers
Huber Road Rollers
Interstate Trampways, 5-T Hd. Winches
Iowa Crushers, Roadmix Pl.
Jaeger Mixers, Hoists, Pumps
Johnson Bins, Batches
Jones Saw Benches

Klauser Snow Plows
Lakewood Road Finishers, Forms, Chuting
McKernan-Terry Hammers
Multi-Foots Pavers
Northern Conveyors
Page Dragline Buckets
Sacramento Oil Distributors
Schramm Compressors
Sun Ray Traffic Signals
Templeton, Kealy Brace, Jacks
Teledo Torches
United 5-T Hd. Winches
Walter Four-Wheel Dr. Trucks
Wehr Motor Graders
Ward Plows
Wheeled Rollers

Member: Associated Equipment Distributors

NORRIS K. DAVIS, INC.
400 Seventh St. San Francisco, Calif.

Representing

LE ROI CO.—Gasoline Power Units and Parts
MINN. STL. & MACHY. CO.—Twin City Engines, parts
HANSON CLUTH & MACHY. CO.—Full Revolving Shovels, Cranes, Draglines, 3/4, 1, and 1 1/2-yd.
KEYSTONE DRILLER COMPANY—Excavating Machines, Shovels, Cranes, Draglines, Pull-Scopes, Skimmers, Plunger Shovels, Pavement Breakers
DAVIS COMPANY—Large Tilting Mixers, 1, 2, 3, and 4-yd., Weigh Batches, Batching Plants, Manual or Full Automatic Operation, Ready-Mix Concrete Plants and Equipment, Motor Truck Concrete Mixers and Carriers, Electrically Operated and Controlled Water Material, Steel Silos, Bins, Bunkers, Hoppers, Bunker Gates, Chutes
O. K. CLUTH & MACHY. CO.—Hoists & Compressors

THE HENRY H. MEYER CO.
658 Munsey Bldg., Washington, D. C.
110 S. Howard St., Baltimore, Md.

Representing

Austin Machinery Co.
Blaw-Knox Co.
Boston & Luskport Bldg. Co.
Brookville Locomotive Co.
Byers Machine Co.
Chas. Oil Burner Co.
Conner & Co., Inc.
Domestic Engine & Pump Co.
E. I. de Pont de Nemours & Co.
Dobbie Fdy. & Machine Co.
Duff Mfg. Co.

A. B. Farquhar Co., Ltd.
Harrington Co.
Lidgerwood Mfg. Co.
Pulsometer Steam Pump Co.
Ransome Concrete Mach. Co.
Richmond Slew Anchor Co.
Sterling Wheelbarrow Co.
Templeton, Kealy & Co.
The Galton Iron Wks. & Mfg. Co.
Union Iron Works
Universal Road Machy. Co.

M. D. MOODY
ACL No. 2—Sect. 1, Riverside Viaduct
Jacksonville, Florida

Representing

Buffalo-Springfield Roller Co.
Cyclone Fence Co.
The Elgin Corporation
E. D. Etnyre & Co.
Do Walt Products Co.
Iowa Mfg. Co.
Chas. Hyatt & Co., Inc.
Littlefield Brothers
Rawls Mfg. Co.
Page Engineering Co.
Freeman Mfg. Co.
General Excavator Co.

Hough-Universal Road Sweepers
Allis-Chalmers Mfg. Co.
Ames-Baldwin-Wyoming Co.
Cleaver-Brooks Co.
Colling Hoist Co.
Jaeger Machine Co.
Sullivan Machinery Co.
Tutill Spring Co.
Lima Locomotive Works, Inc.
Waukesha Motor Co.
Wheeled Roller Corp.

Member: Associated Equipment Distributors

R. S. ARMSTRONG & BRO. CO.
676 Marietta St. Atlanta, Ga.

Representing

ALLIS-CHALMERS Tractors and Road Machinery
AMES-BALDWIN-WYO. MINE Shovels
BEEBE Hand Hoists
BUCHVUS-ERIE Cranes, Shovels
CUTLER Bins, Batches
CARRIG Lights
CHICAGO PNEUMATIC Air Compressors
DOMESTIC Pumps, Hoists
GENERAL ELECTRIC Motors
HEWLETT Road Rollers
HYPERBURST JENNY V-por Cleaning Machine

JAEGER Concrete Mixers, Pumps, Paving Machy.
JONES-SUPERIOR Saw
LAKEWOOD Road Machinery, Handling Equipment
LE ROI Engines
LIDGERWOOD Hoists
McKERNAN-TERRY Pile Hammers
OWEN Buckets
SASSEN Derricks and Winches
UDENHOLM Drill Steel
WATERLOO Bar Benders
WORTHINGTON Pumps

Member: Associated Equipment Distributors

YANCEY BROTHERS, INC.
634 Whitehall St., SW Atlanta, Ga.

"CATERPILLAR" Tractors
Graders, Power Units, etc.
RUX Pavers, Mixers, Sizer
Rips, Road Pumps
BLAW-KNOX Forms, Bins, Buckets, Batches, etc.
BARBER-GREENE Ditchers, Conveyors, Loaders
HYVASS Asphalt Distributors, Sweepers, Sprinklers
LITTLEFORD Asphalt
MUNDY Hoisting Equipment
BUFFALO-SPRINGFIELD Road Rollers

HOUGH-UNIVERSAL Sweepers
INGERSOLL-RAND Air Compressors, Tools
KILLEFER Road Ripper, Drag Scrapers
LAPLANT-CHOATE Crawler Dump Wagons, Bulldozers
McKERNAN-TERRY Pile Hammers
WINSLOW Scales
CEDAR RAPIDS Crushers
DETACHABLE THURSTON Drill Steel and Bits
BAKER-MANEY Wheelers
WARD Road Plows
EUCLID Wagons, Bulldozers
BALL Wagon Graders

Member: Associated Equipment Distributors

F. H. BURLEW COMPANY
221-25 W. Huron St., Chicago, Ill.
Telephone SUPERIOR 5804

AMERICAN HOIST Crawler Cranes, Shovels, Draglines, Bulldozers, Snow Plows
BATES Wire Ties, etc.
BEEBE BROS. Hoists
CHAIN BELT Mixers, Pavers, Pumps, Saw Rigs, Conveyors, Elevators
INGERSOLL-RAND Air Compressors and Tools
INBLEY Concr. Towers, Chuting, Cranes, Shovels, etc.
McKernan-Terry Corp. (Divisions)
McKERNAN-TERRY—Pile Hammers, Extractors
LAMBERT-NATIONAL—Hoists, Cableways
STEELE & CONDUCT—Special Machinery
Wheelbarrows, Concrete Carts, Hose, Cable, Rope, etc., carried in stock

O. T. CHRISTERSON CO.
122 So. Michigan Ave. Chicago, Ill.

Representing

KOENRIG COMPANY—Mixers, Pavers, Cranes, Shovel Dumpers, Mud Jacks
KWIK-MIX COMPANY—Concrete and Bituminous Mixers
C. H. & E. MFG. CO.—Pumps, Saw Rigs, Hoists
GORMAN-RUPP CO.—Self-Priming Centrifugal Pumps
MICHIGAN POWER SHOVEL CO.—Crawler Shovels, Cranes; Truck Shovels, Cranes; 1/2-yard
PARSONS COMPANY—Trench Machines, Turbo Mixers
LE ROI COMPANY—Air Compressors
LITTLEFORD BROS.—Distributors, Tar Kettles, Heaters, Torches
CLEVELAND FORMGRADER CO.—Graders, Scrapers, Rosters, Form Graders, Straight Edges, Finishing Tools
HEITZEL STEEL FORM & IRON CO.—Road Forms, Bins, Batches

PAUL COCHRAN EQUIPMENT CO.
228 N. LaSalle St. Chicago, Ill.

Representing

Thew Shovel Co.
Universal Crane Co.
Worthington Pump & Machy. Co.
Novo Engine Co.
The Knickerbocker Co.
Fairfield Engineering Co.—Conveyors
R. B. Equip. Co.—Power Subgraders
Iowa Manufacturing Co.
Aeroil Burner Co.

Used Equipment—Rentals
Member: Associated Equipment Distributors

SUPERIOR CONSTR. EQ. CO.
1850 South Kostner Ave. Chicago, Ill.

Construction Machinery Co.
Elm, Tanager & Es. Co.—
Mixers, Bar Bits, Air & Electric Vibro Vibrators
Concrete and Black-Top Pavers
Freeman Mfg. Co.—Truck
Turntables
Meritz-Bennett Corp.—
Shoulder Machines
Huber Mfg. Co.—Road Rollers
White Mfg. Co.—Tar Kettles, Heaters, Distributors
"White" Flexible Shaft
Gas or Elec. driven Vibrators
Rogers Bros. Corp.—Trailers
A Complete Line of Construction Tools and Equipment
Carried in Chicago. Tel.: Crawford 6200

PEORIA TRACTOR & EQUIPMENT CO.
400 Franklin Street Peoria, Illinois

Representing

Allsteel Products Mfg. Co.
Athey Truss Wheel Co.
Caterpillar Tractor Co.
Gardner-Denver Co.
The Frank G. Hough Co.
Killer Mfg. Corp.
LaPlant-Choate Mfg. Co.
R. G. LeTourneau, Inc.
Speeder Machinery Corp.
Willamette-Hyster Co.
Wisconsin Foundry & Machine Co.

Telephone 6177

BOWMAN-RALSTON TRACTOR & EQUIPMENT CO.
401 E. Florida St. Evansville, Ind.

Representing

Athey Truss Wheel Co.
LaPlant-Choate Mfg. Co.
Baker Manufacturing Co.
Thew Shovel Company
Killer Manufacturing Co.
Schramm, Inc.—Compressors
Willamette-Ersted Co.—Hoists
Pleaser Gravel Equip. Mfg. Co.
Anthony Company

INDIANA EQUIP. CO., INC.
327-329 West Market St., Indianapolis, Ind.

Representing

ATHEY TRUSS—Wagons, Bulldozers
BARBER-GREENE CO.—Loaders and Conveyors
BUFFALO-SPRINGFIELD —Rollers
"CATERPILLAR"—Road Machinery
"CATERPILLAR"—Tractors
EUCLID—Wagons, Scrapers, Bulldozers
GENERAL—Shovels and Cranes

INGERSOLL-RAND—Compressors, Tools
LAPLANT-CHOATE—Bulldozers, Scrapers, Bulldozers
LIMA—Shovels and Cranes
NIAGARA—Vibrating Screens
OWEN—Clam Shell Buckets
OMAHA—Dragline Buckets
PAGE—Dragline Buckets
SAUERMAN—Cableways
UNIVERSAL—Crushers, Pulverizers

Member: Associated Equipment Distributors

GIERKE-ROBINSON CO.
4th & Ripley Sts. Davenport, Iowa

Representing

BLAW-KNOX—Steel Road, Curb and Gutter Pavers, Bins, Batches, Clamshell Buckets, Truck Turntables, Ord Concrete Road Finishers
CHAIN BELT—Mixers, Pavers, Pumps, Saw Rigs, Conveyors, Elevators
CLYDE—Gasoline and Steam Hoists, Derricks
HOUGH-UNIVERSAL—Sweepers
SULLIVAN—Air Compressors, Tools
TRACKSON—Crawlers, Shovels and Bulldozers
THEY-LORAIN—Cranes, Shovels, Draglines
TIMKEN—Detachable Rock Bits, Steels
UNIVERSAL—Truck Cranes
UNIVERSAL—Form Clamps

Member: Associated Equipment Distributors

THOMAS L. BARRET
112-114 So. Second St., Louisville, Kentucky

Representing

C. H. & E. Pumps and Contractors Equipment
WILLIAMS Clam Shell and Drag Line Buckets
HAISS Loaders and Material Handling Equipment
ARMSTRONG Blast Hole Drills
UNION Hammers and Concrete Buckets
HUG Trucks, Turntables and Subgraders
Mundy Hoisting Engines
VULCAN Locomotives
METAFORM Road Rails, Wall Forms, etc.

"CAMEL" Automatic Tractor Dump Wagon
KENNEDY Gearless Crushers
CORUGATED Bar and Mesh Reinforcement
BARRET Asphalt Expansion Joint
RUSSELL Scrapers, Drag Lines
BAY CITY Shovel Co.
LACROSSE "Tu-Way" Trailers
CEDAR RAPIDS Portable Crushing, Screening & Loading Plants
HERCULES Road Rollers
TUTTILL Highway Guard Rail

Brandeis Machinery & Supply Co.
201 Warnock St. Louisville, Ky.

Representing

J. D. Adams Co.
Aeroil Burner Co., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Buffalo-Springfield Co.
Cameron Steam Pump Works
Chicago W.H. Scale Co.
Clemens Bros. Co.
Clyde Sales Company
The Damsing Company
E. I. de Pont de Nemours & Co.
A. B. Farquhar Co.
Ingersoll-Rand Co.

Inley Mfg. Co.
International Harvester Co.
A. Leach & Sons Rope Co.
McKernan-Terry Corp.
M & W Wire Clamp Co.
National Equip. Corp.
Quick Way Tr. Shovel Co.
Rogers Bros. Corp.
Sagen Derrick Co.
Sauerbrook Co.
Smith Engineering Works
Sterling Machinery Corp.
Sterling Wheelbarrow Co.
Waukesha Motor Co.
Western W. Scraper Co.
Wheeled Roller Corp.

Member: Associated Equipment Distributors

ROY C. WHAYNE SUPPLY CO.
Cor. 8th & Main Sts., Louisville, Ky.

Representing

Caterpillar Tractor Co.
Jaeger Machine Co.
Holtzel Steel Form & Iron Co.
Barnes Manufacturing Co.
Davey Compressor Co.
Hardness Wonder Drill Co.
Chicago Automatic Conveyor Co.
Northwest Engineering Co.
Euclid Crane & Hoist Co.
Athey Truss Wheel Co.
LaPlant-Choate Mfg. Co.
Good Roads Hoists Corp.
New Holland Machine Co.
Timken Roller Bearing Co.
CLEVELAND ROCK DRILL CO.

Member: Associated Equipment Distributors

HENRY A. PETTER SUPPLY COMPANY
Paducah Kentucky

Representing

Alenits Equipment
American Wire Rope, Moth
Bates Bar Ties
Bates Tractors
Beebe Hand Hoists
Black & Decker Tools
Cedar Rapids Crushers
Chain Belt (Box) Mixers
D-A Lubricants
DuPont Explosives
Elastic Expansion Joint
Euclid Scrapers
Farquhar Engines, Boilers
General Electric Motors
Gulf States Reinforcing
Steel
Hansen Excavators
Hauk Heaters and Thawers
Johnsco Bins and Hoppers

LeRel Gas Engines
Lidgerwood Hoisting Machy.
Link-Belt Crane, Shovels
Northwest Shovels, Cranes
Novo Pumps and Hoists
Owens Apparatus
Pneumatic Crane
Rogers Bros. Trailers
Sagen Derricks
Sauerbrook Scrapers
Shank Grader Blades
Teledo Torches
Trackson Tractors
Universal Concr. Accessories
Vulcan Pile Equipment
Wehr Graders
Western Road Machinery
Worthington Pumps
Wyoming Shovels

Member: Associated Equipment Distributors

Equitable Equipment Co., Inc.
410 Camp Street New Orleans, La.

Representing

BROWNING Cranes and Shovels
CAMERON Centrifugal Pumps
CEMENT GUN Gunting and Equipment
CUMMINS Diesel Engines
DEAN BROS. Steam and Power Pumps
EDGE MOOR Water Tube Boilers
GENERAL ELECTRIC Motors, Arc Welders, etc.
HYDROL Goulds Oil Purifiers
INGERSOLL-RAND Air Compressors, Pneu. Tools, Pumps, Engines
INTERNATIONAL Minkel Metal Metal, Inconel
MERRELL Pipe Machines

MOORE Steam Turbines, Reduction Gear
MORRIS Dredging Machy.
MUNDY Hoisting Engines
NOVO Engines, Hoists, Pumps
PLYMOUTH Gas and Diesel Locomotives
PNEU BOX Hoists, Crane
SMITH Concrete Mixers
STEPHENS-ADAMSON Conveyors
THOMAS ENGINEERS Generator, Steam Engines
WEIR-KILBY Pumps and Switches
WELCO Tanks, Pipe
WELCO Trunks, Pipe
WELDING Rods and Equipment

FLETCHER EQUIP. CO., INC.
300 Magazine Street New Orleans, La.

Representing
ARCHER Towers and Chutes
BUTLER Bins, Batches
CLYDE Hoisting Engines and Derricks
FREEMAN Turntables
GALION Graders, Rollers
LE ROI-RIX Portable Air Compressors
LE ROI Gas Engines
LINK-BELT Draglines, Cranes and Shovels
LITTLEFORD Heaters, Kettles

M & M Form Clamps
OWEN Clamshell Buckets
OMAHA Dragline Buckets
REX Mixers, Pavers, Pumps and Saw Rigs
SAUERMAN Cableway Excavators
STERLING Wheelbarrows and Carts
SIMPLEX Trench Braces and Jacks
TOLEDO Torches
WOOD Molybdenum Stock Shovels

Member: Associated Equipment Distributors

ALBAN TRACTOR CO., INC.
725-27 East 25th St. Baltimore, Md.

Representing
"CATERPILLAR" Diesel Tractors, Motors
"CATERPILLAR" Road Machinery
"CATERPILLAR" Combine Harvesters
GENERAL Excavators
GRAVELLY Power Mowers, Plows
LITTLEFORD Tillage Tools
LINK-BELT Shovels and Cranes
EUCALOID ROAD MACHINERY CO.
CLEVELAND ROCK DRILL CO.
SARGENT MFG. COMPANY
LA PLANT-CHOATE MFG. CO.
BACOCK MFG. CO.
WILLAMETTE-ERSTED CO.
BAKER MANUFACTURING CO.
ROTARY SNOW PLOW CO.
ATHEY TRUSS WHEEL CO.
REX-WATSON CORPORATION
DAVEY AIR COMPRESSOR CO.
BLAW-KNOX Bulldozers, Dirtmovers
HOMESTEAD Hyppressure Jenny Cleaner

Member: Associated Equipment Distributors

D. C. ELPHINSTONE, INC.
115 S. Calvert St. Baltimore, Md.
976 Nat'l Press Bldg., Washington, D. C.

Representing
Kehring Co.
Kwik-Mix Co.
Isley Mfg. Co.
Parsons Co.
C. H. & E. Mfg. Co.
Geo. Hais Mfg. Co.
Sauerman Bros. Inc.
All-Chalmers Mfg. Co.
Gardner-Denver Co.
Lien Mfg. Corp.
Owen Bucket Co.
LaBour Co. Inc.
Emerson Pump & Valve Co.
Iowa Mfg. Co.

H. K. Porter Co.
Road Prentice Corp.
Trucon Steel Co.
McKernan-Terry Corp.
Lambert-National Hoists
Goodall Rubber Co.
Miner Co.
E. D. Etnyre & Co.
W. A. Riddell Co.
Hough-Universal Spongers
C. S. Johnson Company
Huber Mfg. Co.
Vibor Co. Ltd.
Wheeler Roller Corp.

Member: Associated Equipment Distributors

JOHN C. LOUIS COMPANY
511 W. Pratt St. Baltimore, Md.

Representing
JAEGE—Concrete Mixers, Wheeling—Corrugated
LAKWOOD—Finishers, etc.
AMERICAN CABLE—Tru-
lar Wire Rope
NORTHWEST—Cranes, Shovels, Draglines
BUTLER—Bins
CENTAUR—Road Mowers
WORTHINGTON—Com-
pressors, Drills, etc.
ALMO—Leaning-Wheel
Graders

WHEELING—Corrugated
GOOD ROADS—Crushers
LITTLEFORD—Asphalt
Heater, Distributors
BURN—Spreaders
JONES—Saw Rigs
GENERAL—Wheelbarrows
TIMKEN—Detachable Rock
Bills
HILYARD-NEWBOLD—
Hot or Cold Asphalt Mix-
ing Plants
ALABAMA—Cast Iron Pipe

Member: Associated Equipment Distributors

THE HENRY H. MEYER CO.
110 S. Howard St., Baltimore, Md.
628 Munsey Building, Washington, D.C.

Representing
Blaw-Knox Co.
Butler & Lockport Bl. Co.
Burr Machine Co.
Phillip Carey Co.
Chas. Oil Burner Co.
Conery & Co., Inc.
Smeeth Eng. & Pump Co.
Doble Fdy. & Mash. Co.
Duff-Norton Mfg. Co.
Gallen Iron Wks. & Mfg. Co.
A. S. Farquhar Co., Ltd.
Harrington Co.

Ingersoll-Rand Co.
A. Leuschen & Sons Rope Co.
Lidgerwood Mfg. Co.
Pierce Equip. Co.
Pulmoner Steam Pump Co.
Ramsco Concrete Machy.
Co.
Richmond Screw Anchor Co.
Sterling Wheelbarrow Co.
Templeton, Kenly & Co.
Union Iron Works
Universal Road Machy. Co.

Member: Associated Equipment Distributors

CLARK-WILCOX COMPANY
790-798 Albany St. Boston, Mass.

Representing
RANSOME—Concrete Mixers, Chuting Equip.
NORTHWEST—Cranes, Shovels, Draglines
BLAW-KNOX—Steel Forms, Bins, Buckets, "Ord" Fin-
ishers
CARTER—"Hundinger" Pumps
INGERSOLL-RAND—Air Compressors
ORR-SEBOW—Hoists, Bolters, Mixers
ROG—Shores and Clamps
HAUCK—Oil Burners and Heaters
HAISS—Elevators, Conveyors and Loaders
ALLIS-CHALMERS—Tractors
BAKER—Bulldozers
SARGENT—Plows
REBE BROS.—Hoists
CLEVELAND—Formgraders
C. S. JAWN CO.—Trailers
BURCH—Road Plovers, Road Machinery
HOMESTEAD—Hyppressure Jenny Cleaner

Member: Associated Equipment Distributors

THE EQUIPMENT CO.
30 Prentiss St. Boston, Mass.

Representing
Link-Belt Cranes and Shovels
Ingersoll-Rand Compressors and Tools
"Williams" Buckets and Trailers
Homelite Pumps and Generators
COMPLETE RENTAL SERVICE

Member: Associated Equipment Distributors

HEDGE & MATTHEIS CO.
285 DORCHESTER AVE. BOSTON, MASS.

Representing
Aerol Burner Co.
American Tubular Elevator Co.
Austin Machinery Corp.
Beaumont-Birch Co.
Dobbin Fdy. & Mash. Co.
Electric Taper & E. Co.
Erie Steel Construction Co.
Hercules Motors Corp.
Huber Mfg. Co.
Ingersoll-Rand Co.
Iowa Mfg. Co.
Jager Machine Co.
Jones-Superior Mach. Co.
Kelley Electric Machine Co.

Lakewood Engineering Co.
LeROI Company
A. Leuschen & Sons Rope Co.
Lima Locomotive Wks., Inc.
Shovel & Crane Div.
McKernan-Terry Corp.
Lambert-Nat'l Hoist. Div.
Red Star Corporation
Tinkon Roller Bearing Co.
Toledo Pressed Steel Co.
Universal Form Clamp Co.
Wehr Company
Wood Shovel & Tool Co.

Member: Associated Equipment Distributors

THOMAS G. ABRAMS, INC.
2411 Fourteenth St. Detroit, Mich.

Representing
Aerol Burner Co.
Archer Iron Works
Brookline Locomotive Co.
(McCormick-Deering Power)
Butler Bin Company
Burch Corporation
Byers Machine Co.
Domestic Engine & Pump Co.
LeROI-Rix Compressors
Saugen Derrick Company
T. L. Smith Company
Smith Engineering Works
Sterling Wheelbarrow Co.
Toledo Pressed Steel Co.
Bates Valve Bag Corp. (Bates Wire Ties)

Member: Associated Equipment Distributors

KELLER TRACTOR & EQ. CO., Inc.
5163-69 Martin Ave., Detroit, Mich.

Representing
Atco—Dirt-moving equipment and bulldozers
Baker Mfg. Co.—Snow plows, road machinery
Blaw-Knox Company—Finishing machines, road forms, bins, batchers and buckets
Bucyrus-Erie Company—Shovels, cranes, draglines
Chain Belt Co.—Mixers, pavers, pumps
Caterpillar Tractor Co.—Tractors, graders, road machinery
D-A Lubricant Co.—Lubricants
Dittler Mfg. Co.—Hercules spreaders
Gardner-Denver Co.—Air compressors and tools
Killer Mfg. Corp.—Road and farm tools
LaPlant-Choate Mfg. Co.—Bulldozers, backfillers, wagons, snow plows
A. Leuschen & Sons Rope Co.—Wire rope
E. D. Etnyre & Co.—Oil and tar distributors and heaters
Timken—Rock bits
Universal Crusher Co.—Gravel Equipment

Member: Associated Equipment Distributors

CONTRACTORS MACHY. CO.
530 Monroe Ave., N.W. Grand Rapids, Mich.

Representing
Jaeger Machine Co.
Lakewood Engineering Co.
Northwest Engineering Co.
Sullivan Machinery Co.
Pioneer Gravel Equipment Mfg. Co.
Butler Bin Company
Clyde Sales Company
Gallen Iron Works
Page Engineering Co.
American Steel & Wire Co.
Burch Corporation
Rosa Snow Plows
Saugen Derrick Company
Sauerman Brothers

Syntroon Company
LeROI Company
Aerol Burner Company
Conery & Company
Jones-Superior Company
Moritz-Bennett Company
Ames Shovels
Rosa Manufacturing Co.
Red Top Steel Post Company
Toledo Pressed Steel Co.
Bates Wire Ties
Electric Taper & Equip. Co.
Sterling Wheelbarrows
Trackson Co.

Member: Associated Equipment Distributors

E. K. S. EQUIPMENT CO.
18 Grandville Ave., S.W. Grand Rapids, Mich.

Representing
ALLIS-CHALMERS—Trac-
tors, Graders, Wagons,
Power Units
BERG—Concrete Finishers
CLEVELAND—Air Tools
DIAMOND—Crushers
Gravel Plants, Washing
Equipment
FLEXIBLE—Road Joint
Machinery
FOUR-WHEEL DRIVE—
Trucks
HELYZEL—Forms, Bins,
Batchers
HOUGH-UNIVERSAL—
Road Sweepers
HUBER—Rollers

INSLEY—Towers, ½-yd.
Shovels
KOEHRING—Shovels,
Cranes
KWIK-MIX—Mixers
LITTLEFORD—Kettles,
Heaters, Asphalt Machin-
ery, Distributors
NAT'L Hoist—Fence
MACHWYLL—Wire Rope
NOVO—Engines, Pumps,
Hoists
PARSONS—Trenchers,
Backfillers
SCHRAMM—Air Compres-
sors, Tools
SHOVEL PICKS and
SMALL TOOLS

Member: Associated Equipment Distributors

BORCHERT-INGERSOLL, INC.
St. Paul, Minn. Duluth, Minn.

Representing
Allis-Chalmers Tractors and Graders
"American" Bulldozers, Snow Plows
Blaw-Knox Bins, Forms, Buckets, Finishers
D-B Hand Hoists
Clyde Hoists, Derricks
Cleaveland Formgraders
Diamond Crushers, Screens
Domestic Pumps
Euclid Wagons, Scrapers
Gopher Road Signs
Hiss Louvers
Hercules Road Rollers

Hough-Universal Sweeper
Koppel Industrial Cars
McKernan-Terry Pile Ham-
mers, Extractors
M-W Lubricants
Michigan Power Shovel
Northern Conveyors
Northwest Shovels, Cranes
Oshkosh 4-whe. Dr. Trucks
"RB" Power Subgraders
Smith Mixers, Pavers
Sullivan Compressors, Tools
Tere Highway Mowers
Whitcomb Locomotives

Member: Associated Equipment Distributors

LANGE TRACTOR & EQ. CO.
304 Lake Ave., S. Duluth, Minn.

Representing
Aerol Tar Kettles, Heaters
Caterpillar Road Machinery
and Trailers
LaPlant-Choate Wagons,
Bulldozers, Snow Plows,
Scrapers
Keystone Excavators, Blast
Hole Drills
Diamond Gravel Crushing,
Screening, Washing
Plants, Conveyors
Killer Scrapers, Road
Discs, Rippers
Davey Air-Cooled Air Com-
pressors
Cleaveland Rock Drills
Lehart Wagons
Ames Baldwin Wyoming Hand Shovels

Blaw-Knox Atco Scrapers,
Bulldozers
Hansen Gas Shovels, Trail-
ers
Williams-Ersted Hoists
Northern Conveyors
Snow Plows
Breakville Gas and Diesel
Locomotives
Oshkosh Four-Wheel Drive
Trucks
Anthony Power Loaders
Leach Concrete Mixers
MacWhyrte Wire Rope
Highway Earth Boring Ma-
chines

Member: Associated Equipment Distributors

THORMAN W. RSHOLT CO.
928 So. Fourth St. Minneapolis, Minn.

Representing
IOWA "Cedar Rapids"
Crusher Plants and Equip-
ment
KOEHRING Pavers, Mix-
ers, Cranes
INSLEY Towers and ½-yd.
Shovels
PARSONS Trenching Ma-
chines, etc.
McCORMICK-DEERING
Industrial Tractors
C. H. & E. Saw Rigs,
Hoists, Pumps
KWIK-MIX Mixers
RIDDLE Power Grader
JOHNSON Batches and
Demountable Bins

TRACKSON Loaders and
Cranes
BYERS Shovels and Cranes
VULCAN Steam and Gas
Locomotives
LIDGERWOOD Hoists
SARGENT Snow Plows
METAL FORMS CORP.
Steel Forms
ROSCO Trailers and Bi-
luminous Distributors
STOCKLAND Graders
WALTER Trucks
GORMAN-RUPP CO. Self-
Priming Centrifugal
Pumps
UNION IRON WORKS
WHEELER Rollers

Member: Associated Equipment Distributors

WM. H. ZIEGLER CO., INC.
Minneapolis, St. Paul, Duluth, Minn., Glasgow, Mont.

Representing
"CATERPILLAR"—Trac-
tors, Engines, Road Ma-
chinery
LA PLANT-CHOATE—
Bulldozers, Snow Plows,
Dump Wagons
LE TOURNEAU—Dirt
Mowing, Road Equipment
KILLER—Road Rippers,
Scrapers
ATHEY—Crawlers, Dump
Wagons, Trailers
BUCYRUS-ERIE—Power
Shovels, Cranes, Draglines
PIONEER—Crushers, Grav-
el Plants
REX—Mixers, Pavers, Mo-
to-Mixers, Pumps, Saw
BUTLER—Bins, Batches

BARBER-GREENE—Con-
veyors, Loaders, Ditchers
F. W. D.—Four-Wheel
Drive Trucks
PLYMOUTH—Locomotives
GARDNER-DENVER—Air
Compressors, Drills
LAPEL TRAILMOBILE—
Semi-Trailers
LESCHEN—Wire Rope
BLAW-KNOX—Madsen
Paving Plants, Atco
Scrapers
LITTLEFORD—Oil Dis-
tributors, Tar Kettles,
Heaters
"WILLIAMS"—Buckets and Trailers
Slusher-McLean Scraper Co.
Ames Baldwin Wyoming Co.
MacWhyrte Co.
Red Star Products Co.
Saugen Derrick Company
Climax Engineering Co.
Schramm, Inc.

Member: Associated Equipment Distributors

BUBLITZ MACHINERY CO.
2141 Washington St., Kansas City, Mo.

Representing
Jaeger Machine Co.
Lakewood Engineering Co.
The Shovel Co.
Barber-Greene Company
Iowa Manufacturing Co.
McKernan-Terry Corp.
Whitcomb Locomotive Co.
Butler Bin Co.
"Williams"—Buckets and Trailers
Slusher-McLean Scraper Co.
Ames Baldwin Wyoming Co.
MacWhyrte Co.
Red Star Products Co.
Saugen Derrick Company
Climax Engineering Co.
Schramm, Inc.

Member: Associated Equipment Distributors

O. B. AVERY COMPANY
1325 Macklind Avenue St. Louis, Mo.

Exclusive Distributors for
American Steel Works
Austin-Western Road Machinery Co.
Blaw-Knox Co.
Chain Belt Co.
Dayton-Sure Grip & Shere Co.
C. R. John Co.
Kewanee Machinery & Conveyor Co.
Kob Manufacturing Co.
McKernan-Terry Corp.
Northwest Engineering Co.
R. B. Equipment Mfg. Co.
Sullivan Machinery Co.
Vulcan Locomotive Works
Koppel Industrial Car & Equip. Co.

Member: Associated Equipment Distributors

CORBY SUPPLY COMPANY
3942-46 W. Pine Blvd., St. Louis, Mo.

Representing
AMERICAN—Flexible Metal Hose
BUHL CO.—Portable Air Compressors
CHAMPION RIVET CO.—Rivets and Welding Rod
DETROIT HOIST & MACH. CO.—Air and Electric
Hoists
DEVILBISS CO.—Paint Spray Equipment
HARDSCOE WONDER DRILL CO.—Rock Drills and
Paving Breakers
WM. H. KELLER, INC.—Super Pneumatic Tools
MUNSELL—Air-Operated Concrete Vibrators
PARNBORN CORP.—Sandblast Equipment
PENNSYLVANIA—A-C Compressors and Pumps
DAVID ROUND & SON—Chain Hoists
STAYNEW—Air and Pipeline Filters
N. A. STRAND & CO.—Flexible Shaft Equipment
VAN DORN—Electric Drills, Grinders and Buffers
VICTOR—Welding and Cutting Apparatus
WESTINGHOUSE—Arc Welding Equipment
GUSTAV. WIEDEKE CO.—Tube Expanders

Member: Associated Equipment Distributors

JOHN FABICK TRACTOR CO.
Gravois & Iowa Aves. St. Louis, Mo.

Representing
Athey Truss Wheel Co.
Cleaveland Rock Drill Co.
Blaw-Knox Company
Caterpillar Tractor Co.
Davey Compressor Co.
Euclid Road Machinery Co.
Killer Mfg. Co.
LaPlant-Choate Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
The Shovel Company
Williams-Ersted Co.
W. K. M. Company

Member: Associated Equipment Distributors

JOSEPH KESL TRACTOR & EQUIP. CO.
1510 North 15th St. St. Louis, Mo.

Representing
Allis-Chalmers Mfg. Co.
American Steel Scraper & Wheelbarrow Co.
The Baker Mfg. Co.
Wm. Bros. Boiler & Equip. Co.
Erie Steel Construction Co.
Gardner-Denver Co.
General Wheelbarrow Co.
Lyle Sign, Inc.
Mail Tool Co.
Toledo Pressed Steel Co.
Aerol Burner Co., Inc.
Contractors Machinery Corp.
Domestic Engine & Pump Co.
Diamond Iron Works, Inc.
Orr & Sembover, Inc.
Bucyrus-Erie Co.
Construction Machy. Co.
Harnischfeger Sales Corp.
Homestead Valve Mfg. Co.
Mid-West Pipe & Supply Co.
Fairbanks, Morse & Co.

Member: Associated Equipment Distributors

C. F. RABBEIT, INC.
1523 N. Broadway St. Louis, Mo.

Representing
C. H. & E. Mfg. Company Littleford Bros.
Cleaver-Brooks Company Parsons Company
Cleaveland Formgrader Co. Union Iron Works, Inc.
Huber Mfg. Company Butler Bin Company
Isley Mfg. Company Frank G. Hough Company
Kehring Company Metal Form Corp.
Kwik-Mix Mixer Co. Thorman W. Rosholt Co.
Lidgerwood Mfg. Company Sterling Machinery Corp.
Union Iron Works

Member: Associated Equipment Distributors

THE GEO. F. SMITH CO.
Franklin & Channing Aves., St. Louis, Mo.
Complete Plants Rented

Representing
Ingersoll-Rand—Compres-
sors, Air Tools
Clyde—Hoists and Derricks
Owen—Clamshell Buckets
Hauck—Heaters
Saugen—Derricks & Winches
Skilaw—Electric Saws,
Drills
Skiffen—Shovels
Lefebvre—Excavators
Symons—Column Clamps
Winlow—Weighing Scales
Universal—Form Clamps
Link-Belt—Cranes, Shovels,
Draglines
Nove—Pumps

Vulcan—Steam and Drop
Hammers
Waukegan—Engines
Mail—Vibrators and Grind-
ers
Archer—Tower Equipment
Red Star—Wheelbarrows
and Shores
Templeton, Kenly & Co.—
Trench Braces, Jacks
Smith—Mixers, Pavers
Vail—Tie Wires and Tools
American Steel & Wire—
Rope

Member: Associated Equipment Distributors

TULLEY EQUIPMENT CO., INC.
4215 Clayton Ave. St. Louis, Mo.

Representing
ORTON—Cranes, Shovels, Draglines, Buckets
LEACH—Mixers, Tower Outfits, Saw Rigs
ROGERS BROS.—Trailers
HUMPHREYS—Pumps
MILWAUKEE—Gasoline Locomotives
McLANAHAN & STONE—Crushers, Screens
Reinforcing Steel and Accessories
Asphalt and Rubber Expansion Joint
Road Building Materials

Member: Associated Equipment Distributors

CONNELLY MACHINERY CO.
2705 Montana Ave. Billings, Mont. 315 2nd Street S.E. Great Falls, Mont.

Distributors of
Caterpillar Tractors, En-
gines, Road Machinery
Pioneer Gravel Plant Equip.
Bucyrus-Erie Shovels, Drag-
lines and Cranes
Bucyrus-Erie Loadmasters
Burkys Ditchers, Backfill-
ers
Buffalo-Springfield Road
Rollers
D-A Lubricants, Oils
Hewitt Bellling, Hose
Tractor-operated Hoists, Scrapers, Dirtmovers, Rippers,
Scarifiers, Bulldozers, Trailbuilders, Backfillers, Snow
Plovers, Loaders, Tract-trails and Wheeled Wagons and
Trailers, etc.

Le Tourneau Dirt Mowing,
Road Bldg. Equip.
Kehler Lighting Plants
Lacrosse Tu-Way Trailers
Hough-Universal Road
Sweepers
Standard Paving and Plant-
ing
Mix Oiling Plants
Distributors—Trailer Oil-
ers and Retorts
Lecher's Wire Rope
Hawstead Hyppressure
Jenny

Member: Associated Equipment Distributors

MIDLAND IMPLEMENT CO., Inc.
Billings, Montana

Representing
FORDSON—Tractors and Industrial Equipment
BARBER-GREENE—Conveyors, Ditchers and Loaders
DIAMOND IRON WORKS—Gravel Equipment
BRENNER—Rippers and Scarifiers
WOOD—Wire Rope Fence
HYSTER—Hoists and Winches
LANSHIRE—Scrapers, Frames and Barrows
SCHRAMM—Compressors
WHEELING CORRUGATING CO.—Metal Culverts
WHEELING—Shovels, Drag Lines and Concrete Mixers
INDUSTRIAL & TRUCK FLAKES
BRODERICK & BASCOM WIRE ROPE CO.—Wire Rope
and Cable
ROSCO—Trail Dumpers and Oiling Equipment
WM. BROS. MFG. CO.—Snow Plows and Rollers
GOODRICH—Transmission and Conveyor Belting
KENNINGTON—Crusher Jaws, Caterpillar Treads, etc.
CLEVELAND—Rock Drills

Member: Associated Equipment Distributors

HALL-PERRY MACHINERY CO.
802-12 E. Iron St., Butte, Mont.

Representing
American Cable Co.
Atlas Imperial Diesel Eng.
Co.
Butler Bin Co.
Chain Belt Co.
Climax Engineering Co.
Egin Corporation
Etnyre & Co.
Gallen Iron Works & Mfg.
Co.
Gardner-Denver Co.
Goodyear Tire & Rubber
Co.
Hansen Trailers
Hazard Wire Rope Co.
Madsen Iron Works

Marmen-Harrington Co.,
Inc.
Mechanix Asphalt Heater Co.
New Engine Co.
Ramsay Winches
Rotary Snow Plow Co.
Sauerman Bros., Inc.
Smith Engineering Works
The Shovel Company
Timken Roller Bearing Serv-
ice & Sales Co.
Columbia Steel Casting Co.
Euclid Road Machy. Co.
Jas. F. Kissler Co.
Willett Mfg. Co.

Member: Associated Equipment Distributors

NORTHWEST EQUIP. CO., Inc.
Box 1112 Great Falls, Mont.

Complete Line of Road Machinery
and Contractors' Equipment

Representing
KOEHRING—Mixers, Pav-
ers, Shovels
PARSONS—Trenchers
T. L. SMITH—Mixers and
Pavers
INSLEY—Concrete Towers
& Chuting Shovels
PANTHER—Oil and Grease
CLEVELAND—Bank Drills
OWEN—Buckets
COLEMAN—Trucks
SCHRAMM—Air Compres-
sors
PIONEER—Gravel Equip.
MACWHYTE—Rope, Plovers,
Scrapers, Frames, etc.

Member: Associated Equipment Distributors

HEYNIGER BROTHERS

Contractors' Equipment
6th Ave. and F St. Belmar, N. J.

JAEGER Concrete Mixers
JAEGER Placing Plants
AEROIL Torches, Heaters
Steel Sidewalk and
Curb Forms
"Mud Hog" Pumps
Material Elevators
Air Compressors
Gasoline Hoists
Trench Pumps
Carbic Lights

Wheelbarrows
Mortar Tubs
Steel Mortar Boxes
Picks and Shovels
Tarpaulins
Scaffold Horses
Electric Drills & Saws
Chain Hoists

DALE & RANKIN, INC.

113 Frelinghuysen Ave., Newark, N. J.

Representing

HELTZEL Road Forms and Bins
P & H Cranes and Excavating Equipment
P & H Hansen Electric Arc Welders
INGERSOLL-RAND Compressors and Tools
STERLING Wheelbarrows
AEROIL Heaters and Tools
ALEMITE Guns and Fittings
REX Mixers and Pavers
REX Pumps
REX Saw Rigs
UNIVERSAL Concrete Accessories
VIBER Elec. & Pneu. Concrete Vibrators
WINSLOW Scales

Member: Associated Equipment Distributors

JOHNSON & DEALAMAN, INC.

60 Marshall Street Newark, N. J.

Representing

RANSOME Pavers, Mixers, Chuting Equipment
SCHRAMM Air Compressors, Tools
ALLIS-CHALMERS Tractors, Graders
JOHNSON Steel Bins and Batches
ERIE Gasoline Rollers
BAY CITY Truck Cranes
MARLOW Centrifugal, Diaphragm and Plunger Pumps
ETNYRE Tar and Asphalt Distributors
WILLIAMS Trailers and Buckets
RED STAR Wheelbarrows, Batch Boxes, Column Clamps
and Adjustable Shores
OSGOOD Shovels, Cranes and Draglines
GENERAL Shovels, Cranes and Draglines
HOTCHKISS Road and Sidewalk Forms
VIBRO-CAST & JACKSON Concrete Vibrators and Elec.
Power Plants

**CONTRACTORS WHITE
SALES CORP.**

Wolfert Ave. at Broadway,
Albany, N.Y.

Representing

White Motor Co.—Trucks Link-Belt Co.
and Busses Baker Mfg. Co.
Allis-Chalmers Mfg. Co.—Huber Mfg. Co.
Tractors, Rd. Machy. Hough Universal Sweepers
Jaeger Machine Co. Main Steel Products Co.
Byers Machine Co. Pioneer Gravel Eq. Mfg. Co.

DOW & COMPANY, INC.

"Equipment for Highways"
Court & Wilkeson Sts., Buffalo, N.Y.

C. H. & E.—Pumps, Hoists, Saw Rigs
BARCO—Gasoline Hammers
CHICAGO PNEUMATIC TOOL CO.—Compressors, Drills
ADAMS—Leaning Wheel Graders
BURN—Spreaders, Maintainers, etc.
TONGAN—Corrugated Culverts
EUGLID—Earth-Moving Equipment
HUGH-UNIVERSAL—Sweepers
McCORMICK-DEERING—Tractors
"METAFORMS"—Concrete Forms
MOHAWK—"Hotstuf" Kettles, Burners
TREW-LORAIN—Shovels, Cranes
UNIVERSAL-LORAIN—Shovels, Truck Cranes
T. L. SMITH—Mixers, Pavers, Tower Pavers
WILLIAMS—Buckets, Trailers
WILLIAMSPORT—Wire Rope
WALTER—Snowblowers, Tractor Trucks
FRANK—Saw Pumps

Member: Associated Equipment Distributors

LLOYD G. ROSS

3090 Main St. Buffalo, N. Y.

Representing

General Excavator Co.
Hercules Roller Co.

Sale and Rent of All Kinds of Construction
Equipment

EUGENE F. VAN NAME

116 John Street Horseheads, N. Y.

Representing

ALLIS-CHALMERS—Tractors, Graders
A-W—Traffic Tread
BAKER—Road Drags, Snow Plows
C. M. C.—Wonder & Marsh-Capron Mixers
HUBER—Rollers
HOTCHKISS—Sidewalk Forms
HANSON—Excavators
INGERSOLL-RAND—Air Compressors
JACKSON—Wheelbarrows
MILES—Concrete Block Machines
THE NORTHERN—Gravel & Coal Conveyors
WILLIAMSPORT—Wire Rope
WISCONSIN SPECIAL—Snow Plows

**COMPLETE MACHINERY
& EQUIPMENT CO., Inc.**

"Specialists in Pumps"
Webster Ave. and Hancock St.
Long Island City New York

Representing

RALPH B. CARTER CO.—Humdinger Self-
Priming Centrifugal Pumps
HUMPHREYS MFG. CO.—Diaphragm, Plunger
and Centrifugal Pumps
LEACH CO.—Concrete Mixers
INGERSOLL-RAND CO.—Air Compressors
COMPLETE—Well Point Systems
—Steel Blasting Mats—
RENTAL SERVICE

Member: Associated Equipment Distributors

GEORGE MALVESE & CO.

New Hyde Park, N. Y.

Long Island Distributors:

CLETRAC Crawler LOCKE Power Mowers
Tractors REX Pumps, Mixers
PLYMOUTH Tractors EUCLID Scrapers
ADAMS Graders OLIVER Implements
SARGENT Snow BRODERICK & BAS-
Flows COM Wire Rope
WORTHINGTON TON Power Mowers

"Brooks for Concrete Equipment"

R. E. BROOKS COMPANY

Equipment for Contractors

50 Church Street New York, N.Y.

NATIONAL EQUIPMENT CORP.

INSLEY MFG. CO.

PARSONS CO.

C. H. & E. MFG. CO.

KOENRICH CO.

HANDY SACK SALER CO.

BLAW-KNOX CO.

CLEAVER-BROOKS CO.

ROSCO MFG. CO.

HUG CO.

"ORD" Concrete Road Finisher

A. P. DIENST CO.*Contractors' Supplies*

140th St. & 3rd Ave., New York, N. Y.

Distributors for

GREDAG Grease
TOLEDO Bull Frog Wheelbarrows
WYOMING Red Edge Shovels
DUFF Sewer Trench Braces
CURRY Wire Ties
KEYSTONE Grease

Telephone MOtt Haven 9-5430

J. C. HOUSTON

50 Church Street New York, N. Y.

Representing

BROWNING CRANE & SHOVEL CO.
HOISTING MACHINERY CO.

Warehouse

ELIZABETH, N.J.—L.V. R.R.

MAHONEY-CLARKE, INC.

Complete Line of Contractors'
Equipment and Supplies

217 Pearl Street New York, N. Y.

Representing

BATES Wire Ties
HERCULES Road Rollers
LAY-SET Preformed Wire Rope
MARLO Self-Priming Pumps
MUNSELL Pneumatic Concrete Vibrators
OSGOOD Shovels, Cranes, etc.
STANLEY Electric Drills, Saws, etc.
THURSTON Detachable Bits
VULCAN Pile Hammers, Extractors and Parts
WILEY and BLAW-KNOX Concrete Buckets
GENERAL Shovels, Cranes, etc.
INGERSOLL-RAND Air Compressors

Warehouse Stock—Service Station

Member: Associated Equipment Distributors

JOHN REINER & CO., Inc.

29 Howard St. New York, N. Y.

Representing

NOVO ENGINE CO.—Gasoline Engines
WISCONSIN MOTOR CORP.—Gasoline Engines
and Power Units
POWER MFG. CO.—Diesel Engines
PERFEX RADIATOR CO.—Radiators
MASON DIESEL ENGINE CO.—Diesel Engines
and Generating Sets
TWIN DISC CLUTCH CO.—Clutches

Telephone CAnal 6-0286

United Hoisting Co., Inc.

165 Locust Avenue

NEW YORK, N. Y.

Representing

Sullivan Machinery Co.
Construction Machinery Co.
G. M. T. Company

Member: Associated Equipment Distributors

N. P. WALTON, JR.

39 Cortlandt Street New York, N. Y.

Representing

INSLEY MFG. CO.— $\frac{1}{2}$ -y.d. Shovels, Cranes,
Draglines
JAEGER MACH. CO.—Truck Mixers, Finishing
Machines, Road Forms, Spreaders
D. C. ELPHINSTONE, INC.—"BEST" Stone
and Chip Spreaders
ERIE STEEL CONSTRUCTION CO.—All-Steel
Bins, Complete Aggremeter Plants, Erie
Buckets, Clamshell, Dragline and Electric
IOWA MFG. CO.—"CEDAR RAPIDS" Crush-
ers, Material Handl. Equip.; Sand, Gravel and
Asphalt Plants
THE KRON CO.—Full-capacity Springless Dial
Scales

BREWSTER & WILLIAMS, INC.

Contractors' Supplies and Equipment

306 S. Salina St. Syracuse, N. Y.

Representing

AMERICAN HOIST Shovels, Cranes, Derricks, Hoists
BUTLER Bins and Measuring Hoppers
C. H. & E. Contractors' Pumps, Hoists, Saw Rigs
HAISS Loaders, Excavators, Conveyors and Buckets
HOTCHKISS Steel Forms
LITTLEFORD Asphalt Heaters and Tools
RANSOME Mixers, Pavers, Towers and Chutes
ROGERS Trailers
SULLIVAN Compressors, Drills and Hoists
WEHR Power Graders

Member: Associated Equipment Distributors

THE SYRACUSE SUPPLY CO.

314 W. Fayette St. Syracuse, N. Y.
Warehouse 358 W. Jefferson St.

Atlas Powder Co.
Athey Truss Wheel Co.
Barber-Greene Co.
Barnes Mfg. Co.
Blaw-Knox Co.
Caterpillar Tractor Co.
Centaur Tractor Co.
Clyde Saine Co.
Euclid Mfg. Co.
Gondyner Tire & Rubber Co.
German Rope Co.
Goulds Pumps, Inc.
Hazard Wire Rope Co.
Ingorsoll-Rand Co.
Johns-Henryville (Expansion
Joint)

Killer Mfg. Co.
Kuehring Co.
LaPlant-Cheney Mfg. Co.
Main Steel Products Co.—
Snow Pumps
Insley Mfg. Co.
Person Co.
Ransome Pump Co.
Universal Pump Clamp Co.
Wickwire Sponser Steel
Corp.
Williamsport Wire Rope Co.
Timken Roller Bearing
Service & Sales Co.—
Timken Bits & Rods

Member: Associated Equipment Distributors

NORTH CAROLINA EQ. CO.

P.O. Drawer 426, 3116 Hillsboro St.

RALEIGH, NORTH CAROLINA

American Cable Company
Aeroli Burner Company
Buckeye Traction Distrib-
Company
Cleveland Rock Drill Co.
Continental Roll & Steel
Foundry Co.
Day Pulverizer Company
Euclid Road Machy. Co.
The Four Wh. Dr. Auto Co.
Gallion Iron Wks. & Mfg. Co.
Gallon Allsteel Body Co.
Good Roads Mach. Corp.
Chas. H. Hoss & Company
Hanson Clutch & Machin-
ery Co.
Iowa Manufacturing Co.

Internat'l Harvester Co.
Jaeger-Lakewood Company
Kaiser Manufacturing Co.
The S. Johnson Company
Kensington Steel Company
Kinney Manufacturing Co.
Joe. F. Kinsler Company
Miami Trailer & Scraper
Company
Michigan Power Shovel Co.
Northwest Engineering Co.
Page Engineering Company
Rogers Brothers Corp.
Schramm, Inc.
Waukena Motor Company
Willott Manufacturing Co.
Whitcomb Roller Corporation

Member: Associated Equipment Distributors

**CAROLINA TRACTOR &
EQUIPMENT COMPANY**

S. Main Ext. Salisbury, N. Car.

Branch Office and Warehouse:
733-35 West Hargett St., Raleigh, N. Car.

WORTHINGTON—Air Compressors and Drills
ETNYRE—Bituminous Distributors, Flusbers
GORMAN-RUPP—Centrifugal Pumps
CATERPILLAR—Tractors, Graders, Power Plants
BLAW-KNOX—Steel Forms, Bins, Buckets, Truckmixers
BARBER-GREENE—Conveyors, Car Unloaders
DIAMOND—Roll, Jaw Crushers
HERCULES—Gas Road Rollers
LAFLANT-CHATEL—Wagons, Bulldozers
BLISSER-MacLEAN—Wheelers, Rippers, Frontes
THEW—Shovels, Cranes
WONDER—Mixers, Pumps, Hoists

Member: Associated Equipment Distributors

**THE BLAISDELL-FOLZ
EQUIP. CO.**

205-219 West Pearl St. Cincinnati, Ohio

Representing

Allis-Chalmers Mfg. Co.—Tractors, Road Machinery
Chas. Belt Co.—Box Pavers, Moto-Mixers, Building Mix-
ers and Pumps
Northwest Engineering Co.—Gasoline Shovels, Cranes,
Draglines, Pull Shovels
Ingorsoll-Rand Co.—Compressors, Pneumatic Tools, Pumps
Clyde Saine Co.—Hoisting Engines, Derricks
Dravo-Doyle Co.—American Tubular Towers
Sauerman Bros., Inc.—Cableways, Power Scrapers, Excavators
Universal Crusher Co.—Crushers
The C. S. Johnson Co.—Bins, Batches
Deister Machine Co.—Flat-O Vibrator Screens
Vulcan Iron Works—Pile Hammers
Wellman Engineering Co.—Clamshell, Dragline Buckets
Saugen Derrick Co.—Derricks

Member: Associated Equipment Distributors

**THE MECHANICAL SUPPLIES
COMPANY**

205-207 Vine St. Cincinnati, Ohio

Representing

LAKEWOOD—Finishers, Subgraders, Graderooters, Road
Forms, etc.
NOVO—Gasoline Engines, Hoists, Pumps, etc.
WORTHINGTON—Air Compressors, Rock Drills, Paving
Breakers, etc.
GENERAL—Shovels, Cranes, Excavators, etc.
JAEGER—Truck Concrete Mixers
KILLEFER—Road Rippers and Rooters, Road Dis-
cussors
JONES-SUPERIOR—Portable Saw Tables, etc.
COLUMBUS—Elevators and Conveyors
SIMPLICITY—Screens
OSGOOD—Shovels, Cranes, etc.
HERCULES—Rollers

THE CLETRAC OHIO SALES CO.

E. 193rd Street and Euclid Ave.
Cleveland Ohio

Representing

THE CLEVELAND TRACTOR CO.—Crawler
Tractors
THE DAVEY COMPRESSOR CO.—Air-Cooled
Compressors
THE EUCLID ROAD MACHY. CO.—Crawler
Wagons, Scrapers
THE WALSH SNOW FLOW CO.—Snow Plows
D-A LUBRICANT CO.—Oil
THE ROC COMPANY—Winches

THE DAY & MADDOCK CO.

Equipment Headquarters

8201 Almira Ave., Cleveland, O.

Representing

American Hoists and Snow La Crosse "Tu-Way" Trail-
Floors Kellogg Flat Machines
American Terry Derricks Kalkreuth-Mixers
American Scrapers & Road Rail Vibrators & Grinders
Drags National V-G Carbide Lights
Barnes Pumps Sauerman Crescent Scrap-
ers & Blocks
Cleveland Formgraders Sterling Wheelbarrows
German-Rupp Self-Priming Sullivan Compressors, Tools
Centrifugal and Hose
Hais Loaders Hill Surfactors
Hercules Road Rollers Temple Screens
Hill Surfactors Toledo Torches
Independent Pneumatic & Universal Crushers
Electric Tools

H. B. FULLER EQUIP. CO.

1836 Euclid Ave. Cleveland, Ohio

Representing

Blaw-Knox Company—Bins, Batches, Forms, Truckmixers,
Buckets, ORD Finishing Machines, Asphalt Plants
Link-Belt Co.—Shovels, Cranes, Draglines, Locomotive
Cranes
Ransome Coner. Machy. Co.—Pavers, Constr. Mixers, Tow-
ers and Chuting Equip.
Baldwin Locomotive Works (Internal Combustion Divi-
sion)—"Whitcomb Locomotives"—Gasoline, Diesel,
Elec. and Storage Battery Locomotives
Electric Tamping & Equip. Co.—Concrete Vibrators, Elec.
Tampers
Moritz-Bennett Corp.—Road Shoulder Finishers, Form
Pullers
Concrete Surfacing Machinery Co.—"Berg" Surfactors
DeWalt Products Corp.—Power Saws
Mohawk Asphalt Heater Co.—Asphalt Kettles, Heaters

**INDUSTRIAL ENGINE PARTS,
INC.**

1053 E. 61st St. Cleveland, Ohio

Representing

Minneapolis-Moline Power Impl. Co.
Climax Engineering Co. Twin Disc Clutch Co.
Fuller & Johnson Mfg. Co.
Wisconsin Motor Corp. (Air-Cooled)
Stover Engine & Mfg. Co.
Scientific Magneto Co.
Wiss Electric Co. Pierce-Governor Co.
Portable Power Tool Corp. Hercules Prod. Co.
LeRoi Co.

W. T. WALSH EQUIPMENT CO.

3088 West 106th St., Cleveland, Ohio. Tel. Clearwater 4400

Barnes Mfg. Co.—Gasoline
Hammers
Barnett Company—Crushers
Cleveland Rock Drill Co.—
Air Tools
Diamond Iron Works—
Crusher Plants
Euclid Road Machinery Co.—
Wagons
Foster Company—Pavers
General Excavator Co.—
Pile Hammers
Hough-Universal—Sweepers
Huber Mfg. Company—Roll-
ers
White Mfg. Co.—Chassee-
White Asphalt Plants &
Heaters

McCormick-Deering—Trac-
tors
McKorman-Terry Corp.—
Pile Hammers
Michigan—Power Shovels
New Engine Co.—Engines,
Light Plants
Reese Mfg. Co.—Reese Dis-
tributors & Oilers
Rums—Graders
Schramm, Inc.—Air Com-
pressors
Timken—Bldg.
Viber Co., Ltd.—Concrete
Vibrators
Wellman Engineering Co.—
"Williams" Bombs

Member: Associated Equipment Distributors

THE TAYLOR TRACTOR CO.

285 Cozzens St. Columbus, Ohio

Representing

Caterpillar Tractor Company—Tractors, Road Machinery, Diesel Engines
Harnischfeger Sales Corp.
LaPlant-Choate Mfg. Co.
Athey Truss Wheel Co.
Killefer Manufacturing Corp.
Baker Manufacturing Co.
Willamette-Ersted Co.
Blaw-Knox Co. (Ateco Div.)
All Steel Products Mfg. Co.

SOUTHERN OHIO EQUIP. CO.

169-171 W. Main St., Zanesville, Ohio

On Route 40

Phone 813

Distributors for

Allis-Chalmers Mfg. Co.
Iowa Mfg. Co.
Osmond Co.
General Excavator Co.
Hercules Co.
W. A. Riddell Co.
Schrann, Inc.
Cleveland Rock Drill Co.

Timken Roller Bearing Co.
D-A Lubricant Co.
Shank Mfg. Co.
MacWhyrte Co.
Traskcon Co.
Apollo Culvert Works
Slusser-McLean Co.

CLYDE EQUIPMENT CO.*Contractors' Equipment and Supplies*

Portland, Ore. Seattle, Wash.

Atlas Imperial Diesel Eng. Co.
Blaw-Knox & Western Pipe Corp.
Clyde Iron Works
Hemlock Corp.
Lincoln Electric Co.
Burrus-Erie Co., Inc.
Geo. Halse Mfg. Co., Inc.

Sauerman Brothers
Sullivan Machinery Co.
Traylor Engr. & Mfg. Co.
Klauser Mfg. Company
T. L. Smith Co.
Allis-Chalmers Mfg. Co.
Lebel Company
Beebe Bros.

Member: Associated Equipment Distributors

HOWARD-COOPER CORPORATION

Portland — Seattle — Spokane — Twin Falls

Representing

International Harvester Co.
(McCormick-Deering Industrial Tractors)
Farber-Greene Co.
Cleveland Rock Drill Co.
Marion-Strauss Shovel Co.
Hughes-Keehan Co.
Cleaver-Brooks Co.
The Jaeger Machine Co.
Burrus-Erie Co. (Symons Crushers)
McKinnon-Terry Corp.
Rotary Snow Plow Co.
Schrann, Inc. (Compressors)
Universal Power Shovel Co.

Suda Co. (Diesel & Gas Eng.)
Faker Mfg. Co.
Walter Motor Truck Co.
Seagrave Corp.
B. F. Goodrich Rubber Co. (Fire Hose)
Winslow (Scales)
Hercules Company
Sterling Wheelbarrow Co.
Wehr Co. (Graders)
Root Spring Scraper Co.
White Mfg. Co.
Erie Steel Cast. Co.
Wheeler Roller Corp.

Member: Associated Equipment Distributors

GASH-STULL CO.

Chester Pennsylvania

Representing

FORDSON Tractor and Equipment
UNIVERSAL POWER SHOVEL CO. Unit Shovels ½ to ½-yd.
OSGOOD Shovels—all types
WEHR CO.—Road Graders, all sizes
TRACKSON CO.—Crawler Wagons, Crawlers
MICHIGAN Power Shovels
SCHRANN Compressors

LOCOMOTIVES

HOISTS—SCRAPERS—WIRE ROPE

MANGANESE DIPPER TEETH

EDELEN & BOYER COMPANY

Office and Warehouse 236 North 23rd St. Philadelphia Penna.

Distributors of

Osmond Shovels, Cranes
General Shovels, Cranes
Muller Pave Pavers
Adams Black Top Pavers
Hitzel Steel Forms, Bins
Hitzel Finishing Mach.
Marsh Capren Mixers
Wunder Concrete Mixers
Marlow Centrifugal Pumps
Marlow Diaphragm Pumps
Chrysler Portable Air Compressors
New Haven Burlapped-Cat-Haven Blankets

Hayward Clamshell Buckets
Huber Rollers
Archer Towers, Buckets
LaCrosse Tu-way Trailers
Burch Stone Spreaders
Sageen Derricks, etc.
Flory Hoists
R-B Power Subgrader
Miles Block Machines
Pulsometer Steam Pumps
Bay City Truck Cranes
Tru-Lay Steel Cable
Reynolds Constr. Furnaces
Jackson Wheelbarrows, etc.

GILES & RANSOME

17th St. & Sedgley Ave., Philadelphia

RANSOME CONCRETE MACHINERY CO.—Concrete Mixers and Appliances
BLAW-KNOX CO.—Clam-shell Buckets, Steel Forms, Steel Buildings, Steel Bins.
CATERPILLAR TRACTOR CO.—Tractors and Road Machinery
RICHMOND SCREW ANCHOR CO.—Concrete Specialties
THE BARNES MFG. CO.—Centrifugal Discharge and Force Pumps
NORTHWEST ENGINEERING CO.—Gasoline Cranes and Shovels
ORD—Road Finishing Machine
CLYDE—Hoisting Engines and Derricks

Member: Associated Equipment Distributors

HOWARD W. READ CORP.

800 N. Delaware Ave., Philadelphia, Pa.

Distributors

DOMESTIC ENGINE & PUMP CO.—Pumps
JONES SUPERIOR—Saw Rigs
LINK-BELT—Cranes and Shovels
PENNA. BOILER WORKS—Boilers
AUSTIN-WESTERN ROAD MACHINERY CO.—Rollers, Graders, etc.

Additional Equipment in Stock:

INGERSOLL-RAND—Compressors

UNIVERSAL—Truck Cranes

SERVICE SUPPLY CORPORATION

20th and Venango Sts., Philadelphia, Pa.

Representing

Bay City Shovels, Inc.—Shovels, Cranes, Cranesmobiles
Beaumont-Bloch—Bins, all sizes
Chain Belt Co.—Box Pavers, Mixers, Truck Mixers, Pumps
Chicago Pneumatic Tool Co.—Air Compressors, Tools
Cleaver-Brooks—Tank Car Heaters, Boilers
Dravo Equipment Co.—American Tubular Towers
Hercules Co.—Road Rollers
Hough-Universal—Sweepers
International Harvester—Industrial Tractors, Crawlers
Littleford Bros.—Asphalt & Tool Heaters, Distributors
McKinnon-Terry—Pile Drivers, Extractors
Nelson Iron Works—Loaders
Lambert-Nat'l—Hoists, Car Pullers, Cableways
Owen Bucket Co.—Clamshell Buckets
Riddell Co.—Graders, Scrapers and Trucks

Member: Associated Equipment Distributors

J. JACOB SHANNON & COMPANY

1744—Market Street—1744

PHILADELPHIA

Representing

Jaeger Machine Co.—Concrete, Truck Mixers, Pumps
Lakewood Engineering Co.—Road Finishers, Spreaders, Material Towers
Allis-Chalmers Mfg. Co.—Tractors, Graders
Baker Mfg. Co.—Buildings, Snow Plows
American Hoist & Derrick Co.—Crawler Cranes, Revolvers, Derricks
American-Terry Derrick Co.—Derricks, Travelers
John A. Reebing's Sons Co.—Wire Ropes, Cable Slings
E. I. du Pont de Nemours & Co.—Paints and Varnishes
Concrete Surfacing Mach. Co.—"Berg" Concrete Surfaces
Red Star Products Co.—Adjustable Shores, Column Clamps
Universal Form Clamps Co.—Concrete Accessories
Sageen Derrick Co.—Derricks and Winches
Hough Hoisting Engine Co.—Gas, Electric and Steam Hoists
Ingersoll-Rand Co.—Air Compressors, Pneumatic Tools

ALLEGHENY EQUIPMENT CORP.

1218 Grant Bldg. Pittsburgh, Pa.

Distributors for

ALLIS-CHALMERS Tractors and Allied Tractor Equipment
"BERG" Highway Surfactors
GARDNER-DENVER Compressors and Drills
HERCULES Road Rollers
HOUGH-UNIVERSAL Road Sweepers
JACKSON Concrete Placement Vibrators
LINK-BELT Power Shovels and Cranes
MICHIGAN ½-yd. Truck and Crawler Shovels and Cranes
REX Moto-Mixers, Building Mixers, Pavers and Pumps.

C. H. ARNOLD COMPANY, Inc.

Road and Street Machinery

Contractors' Equipment

726-730 Park Bldg., Pittsburgh, Pa.

Representing

ADNUN ENGR. & MFG. CO.—Blacktop Paver
BLAW-KNOX COMPANY—Forms, Bins, Finishers
BUFFALO-SPRINGFIELD ROLLER CO.—Road Rollers
BARNES MFG. COMPANY—Multifunction Pavers
THE FOOTE COMPANY—Asphalt Equipment
LITTLEFORD BROTHERS—Crushing and Screening Plants
PIONEER GRAVEL EQUIP. MFG. CO.—Crushing and Screening Plants
SULLIVAN MACHY. CO.—Compressors & Tools
THE SHOVEL COMPANY—Shovels, Cranes, Draglines

WESTERN MATERIAL CO.

Sioux Falls, Huron, Rapid City, Aberdeen, S.D.

Atlas Conveyors
Blaw-Knox Company
Burch Stone Spreaders
"Caterpillar" Equipment
Cleaver Tank Car Heaters
Cleveland Rock Drills
CMC Mixers & Hoists
D-A Lubricant
Hais Loaders
Harris Road Tools
Hough-Universal Sweepers
Hyster Hoists, Yarders
LaPlant-Choate Mfg. Co.
Lebel Company
Lombard Wagons
Le Tourneau Road Tools
Linn Tractor Trucks

Littleford Bros.
Madison Oil Mix Plants
Marshall Truck Scrapers
New Pumps
P & H Shovels, Cranes
Pioneer Gravel Equipment
Phillip Carey Elastic
Rose Oil Distributors
Rotary Snow Plows
St. Paul Bodies, Hoists
Schrann Compressors
Selway Calcium Chloride
Walter Trucks
Wasson Snow Plows
Western Catapult Slings
Wood's Molybdenum Shovels

Member: Associated Equipment Distributors

NIXON-HASSELLE COMPANY INC.

Contractors' Equipment

Chattanooga Tennessee

Representing

BLAW-KNOX Buckets, Forms
INGERSOLL-RAND Compressors
MUNDY HOISTS
AUSTIN-WESTERN Graders, Crushers, Rollers, etc.
BARBER-GREENE Loaders, Conveyors
NORTHWEST Cranes, Shovels
HOMESTEAD Hydraulics
Also Wheelbarrows, Carts, Benders, Cutters, Shovels, etc.

EASTON Dump Bodies, Cars, Trucks
TRACKSON Tractors, Cranes
ARCHER Towers, Spouting Equipment
NEX Mixers, Pavers, Pumps
CLETRAC Tractors
NEWPORT Culvert Pipe
VULCAN Gasoline Locomotives
DOBBIE Derricks
HOUGH—"Universal" Road Jumps

Member: Associated Equipment Distributors

BROOKS-PAYNE-OSBORNE EQUIPMENT CO.

Knoxville 408 Davenport Rd. Tennessee

Buyrus-Erie Co.—Shovels, Cranes, Draglines
International Harvester Co.—Crawlers, Tractors
J. D. Adams Co.—Road Machinery
Gardner-Denver Co.—Compressors, Drills
Timken Roller Bearing Co.—Detachable Bits
Hitzel Steel Form & Iron Co.—Bins, Batches
Chas. Hvas & Co., Inc.—Distributors
Continental Roll & Steel Co.—Woodbridge Trailbuilders
Jaeger Machine Co. Mixers, Concrete
Lakewood Engineering Co. Handling Equipment
Linn Manufacturing Corp.—Linn Tractors
Pioneer Gravel Equip. Mfg. Co.—Crushing, Screening Plants
Hewitt Rubber Corp.—Hose and Belts
Georgia-Carolina Oil Co.—Tractor Lubricants
Independent Pneumatic Tool Co.—Pneum. & Elec. Tools
Taylor-Wharton Iron & Steel Co.—Steel Castings

WILSON-WEESNER-WILKINSON CO.

Nashville Tennessee

Keshring Co.
Kishner Mfg. Co.
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
C. H. & E. Mfg. Co.
Good Roads Machy. Corp.
The Parsons Co.
T. L. Smith Co.
Ingersoll-Rand Co.
Littleford Bros.

McKinnon-Terry Corp.
Western Wheelbarrow
Cleaver-Brooks
American Hoist & Derrick Co.
Russo Mfg. Co.
Ames Baldwin Wyoming Co.
Baker Mfg. Co.
Cleaver-Brooks Co.

NASHVILLE-KNOXVILLE
Warehouse Stocks of Service
Reinforcing Steel and Mesh
Member: Associated Equipment Distributors

BROWNING-FERRIS MACHY. CO.

205 Exposition Ave. Dallas, Texas

Texas at Rice Sts. Houston, Texas

Hitzel Steel Form & Iron Co.
Lakewood Engineering Company
Pioneer Gravel Equip. Mfg. Co.
Barber-Greene Company
Sterling Wheelbarrow Co.
Jaeger Machine Company
Ingersoll-Rand Co.
Foote Co.—Pavers
Littleford Bros.
Thew Shovel Company
Trackson Co.—Crawlers, Hoists
McCormick-Deering—Tractors
Lidgerwood Mfg. Co.
Sullivan Pneumatic Co.
Galion Iron Works & Mfg. Co.
Chas. Hvas & Co., Inc.

Member: Associated Equipment Distributors

R. B. EVERETT & CO.

3112-18 Harrisburg Blvd. Houston, Texas

BLAW-KNOX Road Plant Equipment, Bins, Clam Shell Buckets
CLYDE Hoisting Machy.
"P. & H." Gasoline Cranes
UNIVERSAL Form Clamps
McKINNAN-TERRY Pile Drivers, etc.
CONNER Asphalt Equip.
CHAIN BELT Concrete Mixers, Saw Bligs, Pavers
NOVO Engines, Hoists, Pumps
WYOMING Shovels, Picks
FLYNN Burgdrader

SAUERMAN Cableways
CLEVELAND Wheelbarrows
BATES Wire Ties
PULSOMETER Steam Pumps
PATENT Safety Swinging Scaffolding
TRU-LAY Wire Ropes
BUFFALO-SPRINGFIELD Road Builders
SULLIVAN Compressors
ETNYRE Asphalt Distributors
FLYNN Burgdrader

Member: Associated Equipment Distributors

THE C. H. JONES COMPANY

Construction and Industrial Equipment

134-140 Pierpont Ave. Salt Lake City, Utah

CLETRAC Crawler Tractors and Allied Equipment
GALION Graders and Road Building Machy
LIMA and BAY CITY Power Shovels
SULLIVAN Portable Air Compressors and Tools
DIAMOND Gravel Crushing and Screening Plants
JAEGER Concrete Mixers, Pumps, Hoists
LINK-BELT Elevating and Conveying Machy
ATLAS IMPERIAL Diesel and Natural Gas Engines

PHILLIPS MACHINERY CO.

900 East Cary St. Richmond, Va.

CLYDE SALES CO.
DEWALT PRODUCTS CORP.
ERIE STEEL CONSTRUCTION CO.
SAUERMAN BROTHERS, INC.
CHICAGO PNEUMATIC TOOL CO.
STEPHENS-ADAMSON MFG. CO.
ROGERS BROTHERS CORP.
GENERAL EXCAVATOR CO.
AEROL BURNER CO.
MANITOWOC ENGINEERING WORKS
BROWDER & BASCOM ROPE CO.
CHAIN BELT COMPANY

Also many other lines of Contractors' Equipment

Member: Associated Equipment Distributors

SOUTHERN MACHINERY & SUPPLY CO.

Roanoke Virginia

Austin Machinery Corp.
Austin-Western Road Machinery Co.
Chain Belt Company
Cleveland Tractor Co.
Columbus Conveyor Co.
Cresker-Wheeler Elm. Mfg. Co.
Dering Company
Gardner-Denver Co.
Grusdier Crusher & Pulverizer Co.
George Halse Mfg. Co.
Hitzel Steel Form & Iron Co.

Komington Steel Co.
Linn Mfg. Corp.
Littleford Bros.
MacWhyrte Company
Manhattan Rubber Mfg. Co.
Division
J. S. Mundy Hoisting Eng. Co.
National Superior Co.
The Osgood Company
Timken Roller Bearing Co.
Vulcan Iron Works
T. B. Wood's Sons Co.

Contractors' Equipment in Stock in Our Roanoke Warehouse

PACIFIC HOIST & DERRICK CO.

3200 4th St. Seattle, Wash

*Machinery and Equipment**Representing*

NORTHWEST—Gas and Electric Shovels, Cranes and Draglines
BUHL—Air Compressors
TWIN DISC—Clutches for all purposes
PAGE—Scraper Buckets, Diesel Draglines
MINNEAPOLIS—"Twin City" Gas Engines
CLIMAX—Gasoline Engines
WISCONSIN—Gasoline Engines
MARMON-HERRINGTON—Trucks
DAKE ENGINE CO.
PIONEER—Gravel Equipment
ISAACSON IRON WORKS—Buckets
CLETRAC—Tractors
Member: Associated Equipment Distributors

CONSTRUCTION EQUIPMENT CO.

1118-1124 Ide Ave., Spokane, Wash.

Archer Iron Works
Beebe Bros.
Brydson Mfg. Co.
Brydson & Basson Rope Co.
Browning Crane & Shovel Co.
Buffalo-Springfield Roller Co.
Pulley Bin Co.
Shank Mfg. Co.
Climax Eng. Co.
Detroit Graphite Co.
DeWalt Products Co.
Elgin Sales Corp.
Fairbanks, Morse & Co.
Fate-Roth-Heath Co.
Garco Manufacturing Co.
Homestead Valve Mfg. Co.
Ideal Power Lawn Mower Co.

Kalamazoo Railway Supply Co.
Lebel Co.
Lafayette Air Products Co.
M. & M. Wire Clamp Co.
Nissara Mfg. Co.
Nove Engine & Co.
Bates Valve Bag Corp. (Wire Ties)
Sageen Derrick Co.
Shank Mfg. Co.
Sterling Wheelbarrow Co.
Sullivan Machinery Co.
Sunbeam Mfg. Co.
Templeton, Kelly & Co.
Willamette-Ersted Co.
"Williams" Buckets & Trailers
Wyoming Shovel Works
Young Iron Works

Member: Associated Equipment Distributors

BOEHCK EQUIPMENT CO.

2404 W. Clybourn St. Milwaukee, Wis.

Representing

Barber-Greene Co.
Jaeger Machine Co.
Sageen Machine Co.
Lebel Co.
A. Leebach & Sons Rope Co.
Wellman Engineering Co.
W. Toepfer & Sons Co.
Hitzel Steel Form & Iron Co.
Flexible Road Joint Mach. Co.
McKinnon-Terry Co.
Homestead Valve Mfg. Co.
Sageen Derrick Co.

American Hoist & Derrick Co.
Richmond Screw Anchor Co.
Trackson Co.
Jones-Superior Machine Co.
Fairbanks, Morse & Co.
Youngstown Pressed Steel Co.
Independent Pneumatic Tool Co.
Sageen Tool Co.
Production Equipment Co.
Hetherington & Bower Co., Inc.

Member: Associated Equipment Distributors

DROTT TRACTOR CO., Inc.

3841 W. Wisconsin Ave. Milwaukee Wisconsin

ALLIS-CHALMERS Indus. & Tractor Type Tractors; Power-Operated Elevating & Blade Graders, Motor Patrol Graders, Tractor Type Wagons
PIONEER Gravel Equip.
DROTT Builders, Scrappers, Scrapers, Edimators
HOUGH-UNIVERSAL Sweepers
Wasson Snow Plows
DAVEY Air Compressors
OSHKOSH 4-Wheel Dr. Trucks

KINNEY Road Oilers
TORO Highway Mowers
HERCULES Road Rollers
LA CROSSE Tu-Way Trailers
CLEVELAND Rock Drills
HAUCK Tar Kettles, Heat-ers
KOB Sand Spreaders
RUSSELL Plows, Scrapers, Drags
WAUKESHA Power Units
TIMKIN Roller Bearings

Member: Associated Equipment Distributors

HUNTER TRACTOR & MACHY. CO.

Phone: Orchard-6580

327 So. 16th St. Milwaukee, Wis.

Aerol Burner Co.
American Steel & Wire Co.
Archer Iron Works
Bates Wire Ties
Blaw-Knox Co.
Buyrus-Erie Co.
Buffalo-Springfield Co.
Burch Corp.
Chain Belt Co.
Eustis Road Machy. Co.
Godfrey Conveyor Co.
Iowa Mfg. Co.
Killefer Mfg. Corp., Ltd.

Lyon Iron Works
McKinnon-Terry Corp.
Pacific Marine Supply Co.
Pulsometer Steam Pump Co.
R. B. Mfg. Co.
Buyrus-Erie Co.
Sauerman Bros.
Sterling Wheelbarrow Co.
Sullivan Machinery Co.
Brydson Co.
Toledo Pressed Steel Co.
Universal Form Clamp Co.
Winlow Gvt St. Scale Wks.

JUST EQUIPMENT & SUPPLY CO., Ltd.

173 Colborne Street Montreal, Que., Canada

Athey Truss Wheel Co.
Buffalo-Springfield Roller Co.
Caterpillar Tractor Co.
E. D. Etnyre & Company
Hi-Way Service Corp.
All Steel Products Mfg. Co.
LaPlant-Choate Mfg. Co.
National Steel Car Corp., Ltd.
National Equipment Corp.
Keshring Div., Parsons Div., Kwik-Mix Div.
Iowa Mfg. Co.
American Tractor Equip.
Lombard Wagon Co.
Sterling Machinery Corp.
The Byers Machine Co.
Killefer Mfg. Co.

Master Equipment Co.
Brookville Locomotive Co.
The W. K. M. Company
The Buda Company
Highway Trailer Co.
Pioneer Gravel Eq. Mfg. Co.
Contractors Mach. Corp.
Blaw-Knox Company
Inley Manufacturing Co.
Eustis Road Machy. Co.
C. H. & E. Mfg. Co.
Ward Plow Company
Wood Hydr. Hoist & Body Co.
R. G. Le Tourneau, Inc.
The Anthony Co., Inc.
Willamette-Hyster Co.

THE ALBERT OLSON CO., Ltd.

1148-50 Osler Street

REGINA, SASKATCHEWAN CANADA

"CATERPILLAR" Tractors
Road Equipment
Combined Harvesters
PIONEER Gravel Equipment
LENHART Dump Wagons
LA PLANT-CHOATE Equipment
KILLEFER Scrapers
EUCLID Equipment
P. & H. Shovels and Cranes
PEDLAR PEOPLE'S Culverts

Contractors and Engineers Monthly



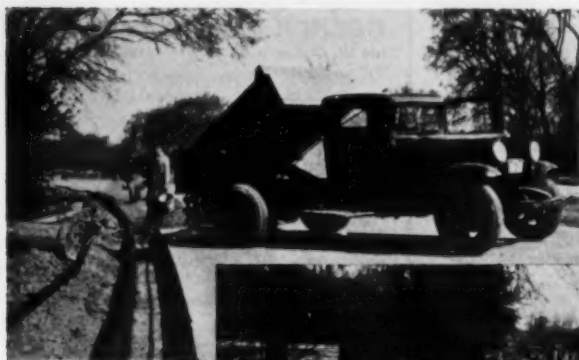
Caterpillar Tractor Co. Photo

Two Men to Operate a Grader Is Typical in India. Going on the Basis That There Are Two Things to Do, the Native Indian Feels He Is Cheating Someone Out of a Job If He Does Them Both. So One Man Steers and the Other Operates the Blade.



Bureau of Foreign and Domestic Commerce Photo

A Typical Road in Java, Netherland India, Showing the Type of Country Through Which Many Miles of Improved Roads Have Been Built, and the Problems of Road Construction Through the Luxuriant Tropical Vegetation. See Page 5.



Pouring 18-Inch Widening Strip on a Boulevard Section of U.S. 40 near the Eastern Limits of Kansas City, Mo. McGlone Paving Co. Was the Contractor. See Page 2.

C. & E. M. Photo

C. & E. M. Photo

Hand Finishing of the Widening Strip Ahead of Lip-Curb Which Was 9 Inches Wide and 3 Inches High. Heavy Traffic Made Progress Slow.



Rolling Deep Snow Off a Road Through Sierra Nevada Mountains in California with an A-C Tractor and Angledozer. See Story on Clearing 4,500 Miles. Page 11.



Arc Welders, Not Flares, on New Steel Bridge at Franklin, Ohio. This Three-Span Structure Is 140 Ft. Long, 40 Ft. Wide and Was Completed in 800 Hours of Welding, Using Two Machines. See Page 6.

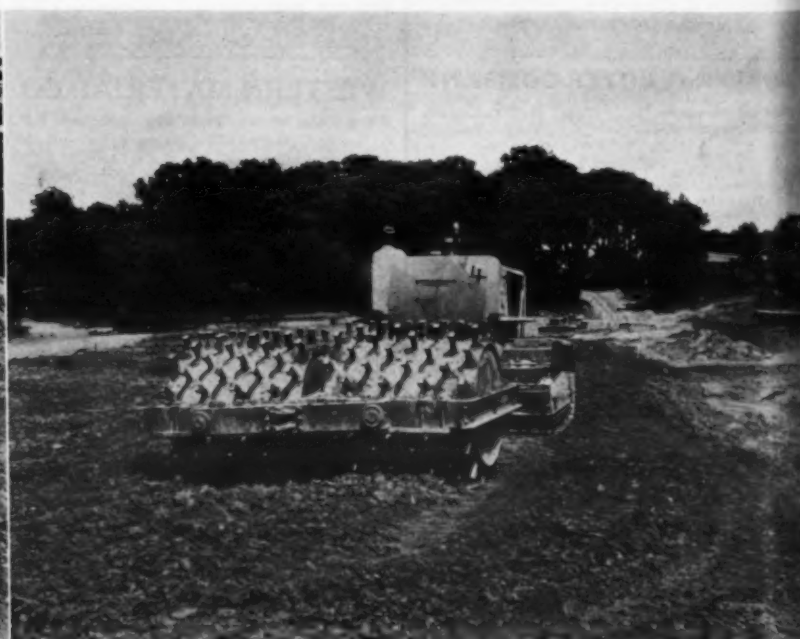


C. & E. M. Photo

Russell DeSalvo, One of Three Brothers Comprising DeSalvo Construction Co., of Cincinnati, and (Right) John W. Tallman, Chief Inspector for the State. See Page 8.



Scenes Typical of the Intensive Dirt-Moving Activity on the Fourteen Dams of the Muskingum Conservancy Project in Eastern Ohio, Involving 10,000,000 Yards of Earth Excavation and 9,000,000 Yards of Earth Embankment. Left, Power



Shovel Loading One of the Fleet of Speedy Trac-Trunks at Charles Mill Dam near Mansfield, Ohio. Right, Rolling the Thoroughly-Sprinkled Embankment to Maximum Compaction with a Double-Unit Sheepfoot Roller. See Page 1.